

## CONTRACT DOCUMENTS GILLETTE TENNIS / PICKLE BALL FACILITY CITY OF WILSON, NORTH CAROLINA



March 2023

Prepared by:

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## ADVERTISEMENT FOR BIDS

City of Wilson

Post Office Box 10

Wilson, North Carolina 27894-0010

Sealed BIDS for "Gillette Athletic Complex - Tennis / Pickleball Facility" including, but not limited to the following:

- Building No. 1: 24,750 sf open wall pre-engineered steel structure to be used for covered pickle ball courts. Including, but not limited to, concrete footing and slab, sub-grade soil treatment, masonry, electrical, mechanical, court fencing, and inground sleeves for net post.
- Building 2: 2,737 sf enclosed, conventionally constructed building to be used for concessions, offices, storage, and toilets. Including, but not limited to, concrete footings and slab, sub-grade soil treatment, load bearing masonry, interior framing, interior finish, wood truss, plumbing, electrical, and mechanical.
- <u>Building 3:</u> 2,737 sf open wall conventionally constructed shelter. Including, but not limited to, concrete footing and slab, sub-grade soil treatment, steel framing, wood truss, and electrical.
- Entrance Road and Parking Lot (asphalt with 24" curb and gutter).
- Two (2) 3-Court Pickleball Facilities including concrete court base, nets, poles and fencing.
- Two (2) 6-Court Tennis Court Facilities including asphalt court, base, nets, poles and fencing.
- Concrete Plaza and 0.5 Mile Asphalt Walking Track.
- One (1) Croquet Court, Three (3) Bocce Ball Courts and Three (3) Horseshoe Pits.
- Site grading includes storm drainage piping, structures, and erosion control measures.
- Water and sewer services including a prefabricated duplex grinder pump station.

will be received by the City of Wilson at the Operations Center Conference Room located at 1800 Herring

Avenue, Wilson, North Carolina until 2:00 P.M., Thursday, April 6, 2023, and then at said office

publicly opened and read aloud.

The CONTRACT DOCUMENTS may be examined at the following locations:

City of Wilson - Wilson, North Carolina ConstructConnect – Plan Room - Online Service Green Engineering, P.L.L.C. – Wilson, North Carolina Copies of the CONTRACT DOCUMENTS may be obtained at the office of <u>Green Engineering</u>, <u>P.L.L.C.</u> located at <u>303 Goldsboro St. East, Wilson, North Carolina 27893</u> upon a non-refundable payment of <u>\$100.00</u> for each set.

Bidders must make positive efforts to utilize businesses owned by minorities and women. The Owner has developed a goal of ten percent (10%) for participation of minority-owned and women- owned business enterprises in construction contracts awarded pursuant to NCGS 143-128. Bidders must comply with the Owner's requirements for W/MBE documentation.

CONTRACTOR shall comply with the requirements of Article 2, Chapter 64 of the General Statutes.

A Pre-Bid Conference has been scheduled for <u>2:00 P.M. Thursday, March 21, 2023</u>. This meeting will be at the <u>City of Wilson's Public Works Conference Room</u> located at <u>1800 Herring Avenue, Wilson</u>, <u>North Carolina</u>.

All prospective Bidders are expected to attend.

The OWNER reserves the right to reject any and all bids.

March 16, 2023 Date David Lee Director of Parks and Recreation

### ARTICLE 1 - DEFINED TERMS

1.01 Terms used in these Instructions to Bidders will have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below which are applicable to both the singular and plural thereof:

A. Bidder--The individual or entity who submits a Bid directly to OWNER.

B. Issuing Office--The office from which the Bidding Documents are to be issued and where the bidding procedures are to be administered.

C. Successful Bidder--The lowest responsible Bidder submitting a responsive Bid to whom OWNER (on the basis of OWNER's evaluations as hereinafter provided) makes an award.

ARTICLE 2 - COPIES OF BIDDING DOCUMENTS

2.01 Complete sets of the Bidding Documents in the number and for the fee, if any, stated in the Advertisement or Invitation to Bid may be obtained from the Issuing Office.

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

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

### **ARTICLE 3 - QUALIFICATIONS OF BIDDERS**

3.01 To demonstrate Bidder's qualifications to perform the Work prior to award, within five days of OWNER's request, Bidder shall submit written evidence such as financial data, previous experience, present commitments, and such other data as may be called for. ARTICLE 4 - EXAMINATION OF BIDDING DOCUMENTS, OTHER RELATED DATA, AND SITE

4.01 Subsurface and Physical Conditions

A. The Supplementary Conditions identify:

1. Those reports of explorations and tests of subsurface conditions at or contiguous to the Site that Engineer has used in preparing the Bidding Documents.

2. Those drawings of physical conditions in or relating to existing surface and subsurface structures at or contiguous to the Site (except Underground Facilities) that ENGINEER has used in preparing the Bidding Documents.

B. Copies of reports and drawings referenced in paragraph 4.01.A will be made available by OWNER to any Bidder on request. Those reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which Bidder is entitled to rely as provided in paragraph 4.02 of the General Conditions has been identified and established in paragraph 4.02 of the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any "technical data" or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

### 4.02 Underground Facilities

A. Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site is based upon information and data furnished to OWNER and ENGINEER by owners of such Underground Facilities, including OWNER, or other.

#### 4.03 Hazardous Environmental Condition

A. The Supplementary Conditions identify those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that ENGINEER has used in preparing the Bidding Documents.

B. Copies of reports and drawings referenced in paragraph 4.03.A will be made available by OWNER to any Bidder on request. Those reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which Bidder is entitled to rely as provided in paragraph 4.06 of the General Conditions has been identified and established in paragraph 4.06 of the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any "technical data" or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

4.04 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 conditions appear in paragraphs 4.02, 4.03, and 4.04 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work appear in paragraph 4.06 of the General Conditions.

4.05 On request, OWNER will provide Bidder access to the Site to conduct such 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.

4.06 Reference is made to Article 7 of the Supplementary Conditions for the identification of the general nature of other work that is to be performed at the Site by OWNER or others (such as utilities and other prime contractors) that relates to the Work for which a Bid is to be submitted. On request, OWNER will provide to each Bidder for examination access to or copies of Contract Documents (other than portions thereof related to price) for such other work.

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

A. Examine and carefully study the Bidding Documents, including any Addenda and the other related data identified in the Bidding Documents;

B. Visit the Site and become familiar with and satisfy Bidder 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 that may affect cost, progress, or performance of the Work;

D. Carefully study all reports of explorations and tests of subsurface conditions at or contiguous 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 Supplementary Conditions as provided in paragraph 4.02 of the General Conditions, and carefully study all reports and drawings of a Hazardous Environmental Condition, if any, at the Site which have been identified in the Supplementary Conditions as provided in paragraph 4.06 of the General Conditions;

E. Obtain and carefully study (or assume responsibility for 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 specific means, methods, techniques, any sequences, and procedures of construction expressly required by the Bidding Documents, and safety precautions and programs incident thereto;

F. Agree at the time of submitting its Bid that 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 and in accordance with the other terms and conditions of the Bidding Documents; G. Become aware of the general nature of the work to be performed by OWNER and others at the Site that relates to the Work as indicated in the Bidding Documents;

H. 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;

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; and

J. Determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work.

4.08 The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 4, that without exception the Bid is premised upon performing and furnishing the Work required by the Bidding Documents and applying specific means, methods, techniques. any 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 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 performing and furnishing the Work.

### ARTICLE 5 - PRE-BID CONFERENCE

5.01 A pre-Bid conference has been scheduled for 2:00 P.M., Thursday, March 21, 2023 at the City of Wilson's Public Works Conference Room located at 1800 Herring Avenue, Wilson, North Carolina. All prospective bidders and suppliers for this project shall be expected to attend this conference. Representatives of OWNER and ENGINEER will be present to discuss the Project. Bidders are encouraged to attend and participate in the conference. ENGINEER will transmit to all prospective Bidders of record such Addenda as ENGINEER considers necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be binding or legally effective.

ARTICLE 6 - SITE AND OTHER AREAS

6.01 The Site is identified in the Bidding Documents. All additional lands and access thereto required for temporary construction facilities, construction equipment, or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by CONTRACTOR. Easement for permanent structures or permanent changes in existing facilities are to be obtained and paid for by OWNER unless otherwise provided in the Bidding Documents.

ARTICLE 7 - INTERPRETATIONS AND ADDENDA

7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to ENGINEER in writing. Interpretations or clarifications considered necessary by ENGINEER in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by ENGINEER as having received the Bidding Documents. Questions received less than ten 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 will be without legal effect.

7.02 Addenda may be issued to clarify, correct, or change the Bidding Documents as deemed advisable by OWNER or ENGINEER.

### ARTICLE 8 - BID SECURITY

8.01 A Bid must be accompanied by Bid security made payable to OWNER in an amount of 5 % of Bidder's maximum Bid price and in the form of a certified or bank check or a Bid Bond (EJCDC No. 1910-28-C, 1996 Edition) issued by a surety meeting the requirements of paragraphs 5.01 and 5.02 of the General Conditions.

8.02 The Bid security of the Successful Bidder will be retained until such Bidder has executed the Contract Documents, furnished the required contract security and met the other conditions of the Notice of Award, whereupon the Bid security will be returned. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within 15 days after the Notice of Award, OWNER may annul the Notice of Award and the Bid security of that Bidder will be Forfeited. The Bid security of other Bidders whom OWNER believes to have a reasonable chance of receiving the award may be retained by OWNER until the earlier of seven days after the Effective Date of the Agreement or 61 days after the Bid opening, whereupon Bid security furnished by such Bidders will be returned.

8.03 Bid security of other Bidders whom OWNER believes do not have a reasonable chance of receiving the award will be returned within seven days after the Bid opening.

### **ARTICLE 9 - CONTRACT TIMES**

9.01 The number of days within which, or the dates by which, the Work is to be (a) Substantially Completed and (b) also completed and ready for final payment are set forth in the Agreement.

### ARTICLE 10 -LIQUIDATED DAMAGES

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

### ARTICLE 11 - SUBSTITUTE AND "OR-EQUAL" ITEMS

11.01 The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents, or "or-equal" materials and equipment as defined in paragraph 6.05 of the General Conditions, or those substitute or materials and equipment approved by the ENGINEER and identified by Addendum. The materials and equipment described in the Bidding Documents establish a standard of required type, function and quality to be met by any proposed substitute or "or-equal" item. Request for ENGINEER's clarification of materials and equipment considered "or-equal" prior to the Effective Date of the Agreement must be received by the ENGINEER at least 5 days prior to the date for receipt of Bids. No item of material or equipment will be considered by ENGINEER as a substitute unless written request for approval has been submitted by Bidder and has been received by ENGINEER at least 15 days prior to the date for receipt of Bids. Each request shall conform to the requirements of paragraph 6.05 of the General Conditions. The burden of proof of the merit of the proposed item is upon the Bidder. ENGINEER's decision of approval or disapproval of a proposed item will be final. If ENGINEER approves any proposed substitute item, such approval will be set forth in an Addendum issued to all prospective Bidders. Bidders shall not rely upon approvals made in any other manner.

# ARTICLE 12 - SUBCONTRACTORS, SUPPLIERS, AND OTHERS

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

12.02 If apparent Successful Bidder declines to make any such substitution, OWNER may determine such Bidder to be nonresponsive and reject the Bid. Declining to make requested substitutions will not constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which OWNER and ENGINEER makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to OWNER and ENGINEER subject to revocation of such acceptance after the Effective Date of the Agreement as provided in paragraph 6.06 of the General Conditions.

12.03 CONTRACTOR shall not be required to employ any Subcontractor, Supplier, individual, or entity against whom CONTRACTOR has reasonable objection.

### ARTICLE 13 - PREPARATION OF BID

13.01 The Bid form is included with the Bidding Documents. Additional copies may be obtained from ENGINEER.

13.02 All blanks on the Bid form shall be completed by printing in ink or by typewriter and the Bid signed. A Bid price shall be indicated for each section, Bid item, alternative, adjustment unit price item, and/or unit price item listed therein, or the words "No Bid," "No Change," or "Not Applicable" entered.

13.03 A Bid by a corporation shall be executed in the corporate name by the president or a vicepresident or other corporate officer accompanied by evidence of authority to sign. If required by State where work is to be performed, the corporate seal shall be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown below the signature.

13.04 A Bid by a partnership shall be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership shall be shown below the signature.

13.05 A Bid by a limited liability company shall be executed in the name of the firm by a member and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm must be shown below the signature.

13.06 A Bid by an individual shall show the Bidder's name and official address.

13.07 A Bid by a joint venture shall be executed by each joint venturer in the manner indicated on the Bid form. The official address of the joint venture must be shown below the signature.

13.08 All names shall be typed or printed in ink below the signatures.

13.09 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid form.

13.10 The address and telephone number for communication regarding the Bid shall be shown.

13.11 The Bid shall contain evidence of Bidder's authority and qualification to do business in the state where the Project is located or covenant to obtain such qualification prior to award of the Contract. Bidder's state contractor license number for the state of the Project, if any, shall also be shown on the Bid form.

ARTICLE 14 - BASIS OF BID; EVALUATION OF BIDS

14.01 Lump Sum (if applicable)

A. Bidders shall submit a Bid on a lump sum basis for the base Bid and include a separate price for each alternate described in the Bidding Documents as provided for in the Bid form. The price for each alternate will be the amount added to the base Bid if OWNER selects the alternate. In the evaluation of Bids, alternates will be applied in the same order as listed in the Bid form.

and / or

14.01 Unit Price (if applicable)

A. Bidders shall submit a Bid on a unit price basis for each item of Work listed in the Bid schedule.

B. The total of all estimated prices will be determined as the sum of the products of the estimated quantity of each item and the unit price Bid for the item. The final quantities and Contract Price will be determined in accordance with paragraph 11.03 of the General Conditions.

C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum. Discrepancies between words and figures will be resolved in favor of the words.

ARTICLE 15 - SUBMITTAL OF BID

15.01 Each prospective Bidder is furnished one copy of the Bidding Documents. The Bid form is to be completed and submitted with the Bid security.

15.02 A Bid shall be submitted no later than the date and time prescribed and at the place indicated in the advertisement or invitation to Bid and shall be enclosed in an opaque sealed envelope plainly marked with the Project title (and, if applicable, the designated portion of the Project for which the Bid is submitted), the name and address of Bidder, and shall be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate envelope plainly marked on the outside with the notation "BID ENCLOSED." A mailed Bid shall

be addressed to the Owner as specified in the Advertisement for Bids.

ARTICLE 16 - MODIFICATION AND WITHDRAWAL OF BID

16.01 A Bid may be modified or withdrawn by an appropriate document duly executed in the 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.

16.02 If within 24 hours after Bids are opened any Bidder files a duly signed written notice with OWNER and promptly thereafter demonstrates to the reasonable satisfaction of OWNER that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid or negotiated, that Bidder will be disqualified from further bidding on the Work.

### ARTICLE 17 - OPENING OF BIDS

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

ARTICLE 18 - BIDS TO REMAIN SUBJECT TO ACCEPTANCE

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

#### ARTICLE 19 - AWARD OF CONTRACT

19.01 OWNER reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. OWNER further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to be nonresponsible. OWNER also reserves the right to waive all informalities not involving price, time, or changes in the Work and to negotiate contract 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 that 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, OWNER will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices and other data, as may be requested in the Bid Form or prior to the Notice of Award.

19.04 In evaluating Bidders, OWNER 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, Suppliers, and other individuals or entities must be submitted as provided in the Supplementary Conditions.

19.05 OWNER may conduct such investigations as OWNER 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, OWNER will award the Contract to the responsible Bidder whose Bid, conforming with all the material terms and conditions of the Advertisement for Bids, is lowest, price and other factors considered.

# ARTICLE 20 - CONTRACT SECURITY AND INSURANCE

20.01 Article 5 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth OWNER's requirements as to performance Bond, payment Bond, and insurance. The CONTRACTOR shall be required to provide insurance coverage equal to or greater than the limits set forth in the Supplementary Conditions. Property insurance (Installation Floater. Builder's Risk, "All Risk" or open peril or special causes of loss policy form, as applicable) shall be required as defined in paragraph 5.06 of the General Conditions and paragraph SC-5.06.A.2 of the Supplementary Conditions. When the Successful Bidder delivers the executed Agreement to OWNER, it must be accompanied by such Bonds and insurance certificates.

### ARTICLE 21 - SIGNING OF AGREEMENT

21.01 When OWNER gives a Notice of Award to the Successful Bidder, it shall be accompanied by the required number of unsigned counterparts of the Agreement with the other contract Documents which are identified in the Agreement as attached thereto. Within 15 days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and attached documents to OWNER. Within 45 days thereafter, OWNER shall deliver one fully signed counterpart to Successful Bidder with a complete set of the Drawings with appropriate identification.

### ARTICLE 22 - SALES AND USE TAXES

22.01 OWNER is not exempt from State of North Carolina sales and use taxes on materials and equipment to be incorporated in the Work. Said taxes shall be included in the Bid.

### ARTICLE 23 - RAIN DAYS

23.01 The following climatological summary, published by the Southeast Regional Climate Center, will be utilized to evaluate contractors' requests for additional contract time due to inclement weather:

| Mean Num |   | ays With 0.10 Incher<br>of Rain | es or |
|----------|---|---------------------------------|-------|
| January  | 7 | July                            | 8     |
| February | 7 | August                          | 7     |
| March    | 7 | September                       | 5     |
| April    | 6 | October                         | 5     |
| May      | 7 | November                        | 5     |
| June     | 7 | December                        | 6     |

Credit for rain days will be allowed, and will begin to accrue, only when they exceed the number of expected rain days shown in the chart above for each respective month.

# ARTICLE 24 - WOMEN AND MINORITY OWNED BUSINESS ENTERPRISES

Bidders must make positive efforts to utilize businesses owned by minorities and women. The Owner has developed a goal of ten percent (10%) for participation of women-owned and minorityowned business enterprises in construction contracts awarded pursuant to NCGS 143-128. Bidders must comply with the Owner's requirements for W/MBE documentation. Copies of the resolution establishing W/MBE goals and required documentation are available upon request to the Owner.

### **Bid Form**

Project Identification:

J. Burt Gillette Athletic Complex Gillette Tennis / Pickleball Facility City of Wilson, North Carolina

Contract Identification and Number:

This Bid Is Submitted To: City of Wilson, North Carolina

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

2.01 Bidder accepts all of the terms and conditions of the Advertisement and Instructions to Bidders, including without limitations those dealing with the dispositions of Bid security. The Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of OWNER.

3.01 In submitting this Bid, Bidder represents, as set forth in the Agreement, that:

A. Bidder has examined and carefully studied the Bidding Documents, the other related data identified in the Bidding Documents, and the following Addenda, receipt of all which is hereby acknowledged.

| Addendum No. | Addendum Date |
|--------------|---------------|
|              |               |
|              |               |
|              |               |
|              |               |

B. Bidder has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. Bidder 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. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in paragraph 4.02 of the General Conditions, and (2) reports and drawings of a Hazard Environmental Condition, if any, which has been identified in the Supplementary Conditions as provided in paragraph 4.06 of the General Conditions.

E. Bidder has obtained and carefully studied (or assumes responsibility for having done 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 the Bidder, including applying the specific means, methods,

techniques, sequences, and procedures of construction expressly required by the Bidding Documents to be employed by Bidder, and safety precautions and programs incident thereto.

F. Bidder does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times and in accordance with the other terms and conditions of the Bidding Documents.

G. Bidder is aware of the general nature of the Work to be performed by OWNER and others at the Site that relates to the Work as indicated in the Bidding Documents.

H. Bidder has correlated 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.

I. Bidder has given ENGINEER written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by ENGINEER is acceptable to Bidder.

J. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.

4.01 Bidder further represents that this Bid is genuine and not made in the interest of or on the behalf of any undisclosed individual or entity and is not submitted in conformity with any agreement or rules of any group, association, organization, or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; Bidder has not solicited or induced any individual or entity to refrain from bidding; and Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over OWNER.

5.01. The Work will be substantially completed within  $\underline{360}$  calendar days after the date when the Contract Time commences to run as provided in paragraph 2.03 of the General Conditions for each of the following contracts:

6.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

## CONTRACT NO. 1 - GILLETTE PICKLEBALL AND TENNIS COURT COMPLEX

| PART A - BUILDING NO. 1 - PICKLEBALL COURT SHELTER |             |  |                   |                   |  |  |
|--|-------------|--|-------------------|-------------------|--|--|
| <u>Item</u>  | <u>Qty.</u> | Description  | <u>Unit Price</u> | <u>Total Cost</u> |  |  |
| 1.   |             | 24,750 sf open wall pre-engineered steel structure to be used for covered pickle ball courts. Including, but not limited to, concrete footing and slab, sub-grade soil treatment, masonry, electrical, mechanical, court fencing, and inground sleeves for net post. |                   |                   |  |  |
|  |             |  |                   |                   |  |  |
|  |             | TOTAL CONSTRUCTION - PART A  |                   | \$                |  |  |

| PART B - BUILDING NO. 2 - CONCESSION BUILDING |             |   |                   |                   |  |  |
|---|-------------|---|-------------------|-------------------|--|--|
| <u>Item</u>                                   | <u>Qty.</u> | Description   | <u>Unit Price</u> | <u>Total Cost</u> |  |  |
| 1.  |             | 2,737 sf enclosed, conventionally constructed building to be used for concessions, offices, storage, and toilets. Including, but not limited to, concrete footings and slab, sub-grade soil treatment, load bearing masonry, interior framing, interior finish, wood truss, plumbing, electrical, and mechanical. |                   |                   |  |  |
|   |             | TOTAL CONSTRUCTION - PART B   |                   | \$                |  |  |

| PART C - BUILDING NO. 3 - OPEN SHELTER |             |   |                   |                   |  |
|--|-------------|---|-------------------|-------------------|--|
| <u>Item</u>                            | <u>Qty.</u> | Description   | <u>Unit Price</u> | <u>Total Cost</u> |  |
| 1.                                     | 1.0         | 2,737 sf open wall conventionally constructed shelter. Including, but not limited to, concrete footing and slab, sub-grade soil treatment, steel framing, wood truss, and electrical. |                   |                   |  |
|  |             | TOTAL CONSTRUCTION - PART C   |                   | \$                |  |

| tem | <u>Qty.</u> | Description   | <u>Unit Price</u> | <u>Total Cost</u> |
|-----|-------------|---|-------------------|-------------------|
| 1.  | 1.0         | LS Mobilization to Site   |                   |                   |
| 2.  | 2.0         | AC Clearing and Grubbing with Off-Site Disposal                             |                   |                   |
| 3.  | 100.0       | LF Existing Curb and Gutter Removal   |                   |                   |
| 4.  | 1.0         | LS Unclassified Excavation (Entrance Road, Parking Lot and Site) to Achieve |                   |                   |
|     |             | Proposed Subgrade Estimated to be +/-15,000 CY                              |                   |                   |
| 5.  | 500.0       | CY Undercut Excavation with On-Site Disposal                                |                   |                   |
| 6.  | 500.0       | CY Select Backfill (Off-site, compacted in-place)                           |                   |                   |
| 7.  | 500.0       | SY Soil Stabilization Engineering Fabric                                    |                   |                   |
| 8.  | 3,200.0     | LF 24-Inch Concrete Curb Including Parking Islands & Valley Gutter          |                   |                   |
| 9.  | 7,450.0     | SY 8" Crushed Concrete Compacted In-Place Asphalt Pavement Subgrade         |                   |                   |
| 10. | 7,450.0     | SY 2" Asphalt Pavement Type SF9.5B to Include Striping and H/C Signage      |                   |                   |
| 11. | 1,200.0     | SY Concrete Sidewalk (4" Depth - Type A )                                   |                   |                   |
| 12. | 3,000.0     | SY Concrete Plaza (4" Depth / WWM Reinforcement - Type B)                   |                   |                   |
| 13. | 3,000.0     | SY Crushed Concrete (6" Compacted Base for Asphalt Walking Trail - 10'      |                   |                   |
| 14. | 2,500.0     | SY 2" Asphalt S9.5B (8' Wide Walking Trail)                                 |                   |                   |
| 15. | 180.0       | LF 15-Inch RCP Storm Drainage Pipe w/ Stone Bedding                         |                   |                   |
| 16. | 200.0       | LF 18-Inch RCP Storm Drainage Pipe w/ Stone Bedding                         |                   |                   |
| 17. | 500.0       | LF 24-Inch RCP Storm Drainage Pipe w/ Stone Bedding                         |                   |                   |
| 18. | 80.0        | LF 60-Inch RCP Storm Drainage Pipe w/ Stone Bedding                         |                   |                   |
| 19. |             | EA 6-Inch HDPE Roof Drain Lateral Including Down Spout Adaptors             |                   |                   |
| 20. | 960.0       | LF 12-Inch HDPE Storm Drainage Pipe w/ Stone Bedding                        |                   |                   |
| 21. | 380.0       | LF 15-Inch HDPE Storm Drainage Pipe w/ Stone Bedding                        |                   |                   |
| 22. |             | LF 18-Inch HDPE Storm Drainage Pipe w/ Stone Bedding                        |                   |                   |
| 23. | 300.0       | LF 24-Inch HDPE Storm Drainage Pipe w/ Stone Bedding                        |                   |                   |
| 24. |             | EA 15-Inch Flared End Section (Concrete)                                    |                   |                   |
| 25. | 3.0         | EA 18-Inch Flared End Section (Concrete)                                    |                   |                   |
| 26. | 5.0         | EA 24-Inch Flared End Section (Concrete)                                    |                   |                   |
| 27. | 2.0         | EA 60-Inch Flared End Section (Concrete)                                    |                   |                   |
| 28. | 5.0         | EA Catch Basin w/ Inlet Protector   |                   |                   |
| 29. | 20.0        | EA Drop Inlet w/Inlet Protector   |                   |                   |
| 30. | 1.0         | EA Nyloplast Drain Inlet to Include 40 LF 4" PVC to DI #9                   |                   |                   |
| 31. | 1.0         | EA Storm Sewer Manhole  |                   |                   |
| 32. | 140.0       | LF Trench Drain to Include 6" HDPE to DI # 6                                |                   |                   |
| 33. | 340.0       | LF 6" Perforated Underdrain Including Washed Stone and Engineering Fabric   |                   |                   |
| 34. | 1,300.0     | LF 4-Inch PVC Sch. 40 Sleeves with End Caps                                 |                   |                   |
| 35. |             | LF Temporary Diversion Ditch Including Matting                              |                   |                   |
| 36. | 60.0        | SY Class A Stone 1.50 Ft. Depth w/ Fabric Underliner                        |                   |                   |
| 37. | 80.0        | SY Class B Stone 2.0 Ft. Depth w/ Fabric Underliner                         |                   |                   |
| 38. | 4,400.0     | LF Silt Fence to Include Silt Fence Outlets                                 |                   |                   |
| 39. |             | EA Waddle Check Dam   |                   |                   |
| 40. | 1,000.0     | SY Excelsior Matting  |                   |                   |
| 41. |             | EA Construction Entrance  |                   |                   |
| 42. | 8.0         | AC Seeding and Mulching   |                   |                   |
| 43. | 2.0         | LS Concrete Washout Area(s)   |                   |                   |
| 44. | 2.0         | Sediment / Skimmer Basin (Temporary Erosion Control)                        |                   |                   |
|     |             |   |                   |                   |

| PART E - CROQUET, BOCCE BALL, SHUFFLEBOARD & HORSESHOE PIT AREAS |             |  |                   |                   |  |  |
|--|-------------|--|-------------------|-------------------|--|--|
| <u>Item</u>  | <u>Qty.</u> | Description  | <u>Unit Price</u> | <u>Total Cost</u> |  |  |
| 1.   | 1,317.0     | SY Concrete Sidewalk (4" Depth - Type A ) with Turndown Curb on Interior |                   |                   |  |  |
|  |             | of Croquet Court, Bocce Ball Courts and Horseshoe Pits                   |                   |                   |  |  |
| 2.   | 270.0       | LF 4-Inch Perforated Underdrain in Washed Stone Trench                   |                   |                   |  |  |
| 3.   | 190.0       | LF 6-Inch Perforated Underdrain in Washed Stone Trench                   |                   |                   |  |  |
| 4.   | 270.0       | TONS #57 Washed Stone for Croquet and Bocce Ball Courts                  |                   |                   |  |  |
| 5.   | 200.0       | CY Excavation in Croquet Court, Bocce Ball Court and Horseshoe Pit Areas |                   |                   |  |  |
|  |             |  |                   |                   |  |  |
|  |             | TOTAL ESTIMATED CONSTRUCTION - PART E                                    |                   | \$                |  |  |

| PART F - PICKLEBALL COURTS |             |   |                   |                   |  |  |
|----------------------------|-------------|---|-------------------|-------------------|--|--|
| <u>Item</u>                | <u>Qty.</u> | <b>Description</b>  | <u>Unit Price</u> | <u>Total Cost</u> |  |  |
| 1.                         |             | LS Provide all labor, material and equipment to install complete the Pickleball<br>Courts including foundation preparation, foundation stone (6" CABC), Class B<br>vapor barrier, woven wire reinforced concrete slab (5" 3,000 PSI), net posts<br>foundations, net posts, netting, PVC coated fencing (8' Height) including gates,<br>(City of Wilson will provide surface coating and striping) and all other<br>materials/components as shown on the drawings and/or included in the project<br>specifications for the Lump Sum Amount of: |                   |                   |  |  |
|                            |             | TOTAL ESTIMATED CONSTRUCTION - PART F   |                   | \$                |  |  |

| PART G      | - TENNI     | S COURTS   |                   |                   |
|-------------|-------------|--|-------------------|-------------------|
| <u>Item</u> | <u>Qty.</u> | <b>Description</b>   | <u>Unit Price</u> | <u>Total Cost</u> |
| 1.          |             | LS Provide all labor, material and equipment to install complete the Tennis<br>Court construction including viewing area between courts to include 8" CABC<br>/ crushed concrete base, 2" asphalt Type S9.5B, net post and center anchor<br>assembly foundations, net posts, nets, vinyl coated fencing (8' height)<br>including gates, (City of Wilson will provide surface coating and striping) and<br>all other materials/components as shown on the drawings and/or included in the<br>project specifications for the Lump Sum Amount of: |                   |                   |
|             |             |  |                   |                   |
|             |             | TOTAL ESTIMATED CONSTRUCTION - PART G  |                   | \$                |

| PART H      | - WATE      | R & SANITARY SEWER SERVICE   |                   |                   |
|-------------|-------------|--|-------------------|-------------------|
| <u>Item</u> | <u>Qty.</u> | Description  | <u>Unit Price</u> | <u>Total Cost</u> |
| 1.          | 1.0         | LS Connection to existing 8-inch water main with cut in sleeve           |                   |                   |
| 2.          | 2.0         | EA 6-Inch Gate Valve   |                   |                   |
| 3.          | 1,040.0     | LF 6-Inch PVC C-900 Water Main   |                   |                   |
| 4.          | 32.0        | LF 6-Inch Ductile Iron Water Main  |                   |                   |
| 5.          | 1.0         | EA Fire Hydrant  |                   |                   |
| 6.          | 125.0       | LF 2-Inch Water Service to Include 2-Inch Meter and Enclosure            |                   |                   |
| 7.          | 750.0       | LBS MJDI Compact Fittings  |                   |                   |
| 8.          | 327.0       | LF 6-Inch Sewer Service Pipe including Clean-outs and Boxes              |                   |                   |
| 9.          | 1.0         | EA Duplex Grinder Pump Station (Prefabricated)                           |                   |                   |
| 10.         | 983.0       | LF 3-Inch Diameter PVC Force Main  |                   |                   |
| 11.         | 20.0        | LF 3-Inch Diameter Ductile Iron Force Main                               |                   |                   |
| 12.         | 1.0         | EA Core Ex. Manhole for 3-Inch Force Main Connection                     |                   |                   |
| 13.         | 40.0        | SY Asphalt Drive (Remove and Replace for 3-Inch Force Main Installation) |                   |                   |
|             |             |  |                   |                   |
|             |             | TOTAL ESTIMATED CONSTRUCTION - PART H                                    |                   | \$                |
|             |             | TOTAL ESTIMATED CONSTRUCTION - PARTS A - H                               |                   | \$                |

### Alternate No. 1:

The Contractor shall use galvanized coating on all steel members (Pickleball Court Shelter and Open Shelter) in lieu of specified painting for the Lump Sum add/deduct amount of:

\$

A. Unit Prices, if applicable, have been computed in accordance with paragraph 11.03.B of the General Conditions.

B. Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all Unit Price Bid items will be based on actual quantities provided, determined as provided in the contract Documents.

7.01 Bidder agrees that the Work will be substantially completed and ready for final payment in accordance with paragraph 14.07.B of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.

7.02 Bidder accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the work within the times specified above, which shall be stated in the Agreement.

8.01 The following documents are attached to and made a condition of the Bid:

- A. Required Bid security in the form of Bid Bond Certified Check (circle type of security provided);
- B. Identification of Minority Business Participation Form
- C. Either Affidavit A Listing of Good Faith Efforts or Affidavit B Intent to Perform Contract with <u>Own</u> Workforce, as appropriate.

9.01 The terms used in this Bid with the initial capitol letters have the meanings indicated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

SUBMITTED on \_\_\_\_\_\_, \_\_\_\_\_,

State Contractor License No. \_\_\_\_\_\_. (If applicable)

Employer's Tax ID No.

| If Bidder is:<br>An Individual  |                      |
|---|----------------------|
| Name (typed or printed):  | SEAL,                |
|   | if required          |
| By: (Individual's signature)  | by State             |
| Doing business as:  |                      |
| Business address:   |                      |
|   |                      |
| Phone No. ()         FAX No. ()         E-Mail Address                  |                      |
| A Partnership Partnership Name:   | SEAL,                |
| By: (Signature of general partner attach evidence of authority to sign) | by State             |
|   |                      |
| Name (typed or printed):  |                      |
| Business address:   |                      |
|   |                      |
| Phone No. ( FAX No. ( E-Mail Address                                    |                      |
| A Corporation Corporation Name:   |                      |
| State of Incorporation:   |                      |
| Type (General Business, Profession, Service, Limited Liability):        |                      |
|   |                      |
| By: (Signature attach evidence of authority to sign)                    |                      |
|   |                      |
| Name (typed or printed):  |                      |
| Title:  | CORPORATE<br>SEAL,   |
| Attest (Signature of Corporate Secretary)                               | if required by State |
| (Signature of Corporate Secretary)                                      |                      |
| Business address:   |                      |
|   |                      |
| Phone No. ( FAX No. ( E-Mail Address                                    |                      |
|   |                      |
| Date of Qualification to do business is                                 |                      |
|   |                      |

# A Joint Venture

| Joint Venture Name:   |                                  |
|---|----------------------------------|
| By: (Signature of joint venture partner attach evidence of authority to sign) |                                  |
| Name (typed or printed):  | _                                |
| Title:  | SEAL,<br>if required             |
| Business address:   | by State                         |
| Phone No. ( FAX No. ( E-Mail Address  | _                                |
| Joint Venture Name:   |                                  |
| By:(Signature of joint venture partner attach evidence of authority to sign)  |                                  |
| Name (typed or printed):  |                                  |
| Title:  | SEAL,<br>if required<br>by State |
| Business address:   |                                  |
| Phone No. () FAX No. () E-Mail Address  | _                                |
| Phone and FAX Number, and Address for receipt of official communications:     |                                  |
|   |                                  |

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

### **BID BOND**

BIDDER (Name and Address):

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

### OWNER (Name and Address):

### <u>BID</u>

BID DUE DATE: \_\_\_\_\_ PROJECT (Brief Description Including Location):

### BOND

| BOND NUMBER:                        |           |
|-------------------------------------|-----------|
| DATE (Not later than Bid due date): |           |
| PENAL SUM:                          |           |
| (Words)                             | (Figures) |

IN WITNESS WHEREOF, Surety and Bidder, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Bid Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

| BIDDER                           |        | SURETY   |
|----------------------------------|--------|--|
| Bidder's Name and Corporate Seal | (Seal) | (Seal)<br>Surety's Name and Corporate Seal               |
| By:Signature and Title           |        | By:<br>Signature and Title<br>(Attach Power of Attorney) |
| Attest: Signature and Title      |        | Attest: Signature and Title                              |

Note: (1) Above addresses are to be used for giving required notice.

(2) Any singular reference to Bidder, Surety, OWNER or other party shall be considered plural where applicable.

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1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to pay to OWNER upon default of Bidder the penal sum set forth on the face of this Bond.

2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by OWNER) the executed Agreement required by the Bidding Documents and any performance and payment Bonds required by the Bidding Documents.

3. This obligation shall be null and void if:

- 3.1. OWNER accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by OWNER) the executed Agreement required by the Bidding Documents and any performance and payment Bonds required by the Bidding Documents, or
- 3.2. All Bids are rejected by OWNER, or
- 3.3. OWNER fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by paragraph 5 hereof).

4. Payment under this Bond will be due and payable upon default by Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from OWNER, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.

5. Surety waives notice of and any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by OWNER and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.

6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in paragraph 4 above is received by Bidder and Surety and in no case later than one year after Bid due date.

7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.

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00410-2

8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.

9. Surety shall cause to be attached to this Bond a current and effective Power or Attorney evidencing the authority of the officer, agent or representative who executed this Bond on behalf of Surety to execute, seal and deliver such Bond and bind the Surety thereby.

10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.

11. The term "Bid" as used herein includes a Bid, offer or proposal as applicable.

BID BOND: 2 OF 2

## NOTICE OF AWARD

| Dated   |                                    |
|---|------------------------------------|
| TO:(BIDDER)   |                                    |
| ADDRESS:  |                                    |
|   |                                    |
| Contract:   |                                    |
| Project: J. Burt Gillette Athletic Complex-Athletic Field Improvements  |                                    |
| You are notified that your Bid dated for the above Contract has been const<br>the apparent Successful Bidder and have been awarded a Contract for                         |                                    |
|   |                                    |
| The Contract Price of your Contract is Dollars (\$  | ).                                 |
| copies of each of the proposed Contract Documents (except Drawings) accompar<br>Award sets of the Drawings will be delivered separately or otherwise made<br>immediately. | iy this Notice of available to you |
| You must comply with the following conditions precedent within fifteen days of the this Notice of Award.  | date you receive                   |
| 1. Deliver to the OWNER <u>five (5)</u> fully executed counterparts of the Contract Do of the Contract Documents must bear your signature].                               | ocuments. [Each                    |
|   |                                    |

2. Deliver with the executed Contract Documents the Contract security (Bonds) as specified in the Instructions to Bidders (Article 20), [and] General Conditions (paragraph 5.01) [and Supplementary Conditions (paragraph SC-5.01).]

3. (List other conditions precedent).

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

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

(OWNER)

By:

(AUTHORIZED SIGNATURE)

(TITLE)

NOTICE OF AWARD: 2 OF 2

## CERTIFICATE OF OWNER'S ATTORNEY

I, the undersigned, \_\_\_\_\_\_, the duly authorized and acting legal representative of \_\_\_\_\_\_ do hereby certify as follows: I have examined the attached contract(s) and performance and payment bond(s) and the manner and execution thereof, and I am of the opinion that each of the aforesaid agreements has been duly executed in proper form; and that the foregoing agreements constitute valid and legally binding obligations upon the parties executing the same in accordance with the terms, conditions,

and provisions thereof.

This \_\_\_\_\_\_ day of \_\_\_\_\_\_, 2023

(Signature)

CERTIFICATE OF OWNER'S ATTORNEY: 1 OF 1

\* 

## EJCDC STANDARD FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR ON THE BASIS OF A STIPULATED PRICE

## FUNDING AGENCY EDITION

THIS AGREEMENT is by and between <u>the City of Wilson, North Carolina</u> (hereinafter called O

(hereinafter called OWNER) and

(hereinafter called CONTRACTOR).

OWNER and CONTRACTOR, in consideration of the mutual covenants hereinafter set forth, 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:

J. Burt Gillette Athletic Complex Gillette Tennis / Pickleball Facility Wilson, North Carolina

## **ARTICLE 2 - THE PROJECT**

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

J. Burt Gillette Athletic Complex Gillette Tennis / Pickleball Facility Wilson, North Carolina

## **ARTICLE 3 - ENGINEER**

#### 3.01 The Project has been designed by *Green Engineering*, *P.L.L.C.*

who is hereinafter called ENGINEER and who is to act as OWNER's representative, assume all duties and responsibilities, and have the rights and authority assigned to ENGINEER in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

## **ARTICLE 4 – CONTRACT TIMES**

#### 4.01 *Time of the Essence*

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

## 4.02 Days to Achieve Substantial Completion

The Work will be substantially completed within <u>360</u> calendar days after the date when the Contract Time commences to run as provided in paragraph 2.03 of the General Conditions for each of the following contracts:

#### 4.03 Liquidated Damages

A. CONTRACTOR and OWNER recognize that time is of the essence of this Agreement and that OWNER will suffer financial loss if the Work is not completed within the time(s) specified in paragraph 4.02 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by OWNER if the Work is not completed on time. Accordingly, instead of requiring any such proof, OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty), CONTRACTOR shall pay OWNER \$\_500.00\_ for each day that expires after the time specified in paragraph 4.02 for Substantial Completion until the Work is substantially complete.

## **ARTICLE 5 - CONTRACT PRICE**

5.01 OWNER shall pay CONTRACTOR for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the amounts determined pursuant to paragraphs 5.01.A, 5.01.B, and 5.01.C below:

A. For all Work other than Unit Price Work, a Lump Sum of:

(use words) (\$\_\_\_\_) (figure)

All specific cash allowances are included in the above price and have been computed in accordance with paragraph 11.02 of the General Conditions.

B. For all Unit Price Work, an amount equal to the sum of the established unit price for each separately identified item of Unit Price Work times the estimated quantity of that item as indicated in this paragraph 5.0l.B:

## **UNIT PRICE WORK**

| <u>No</u> . | Item                     | <u>Unit</u> | Estimated<br>Quantity | Unit Price | Total<br><u>Estimated</u> |
|-------------|--------------------------|-------------|-----------------------|------------|---------------------------|
|             |                          |             |                       |            |                           |
|             |                          |             |                       |            |                           |
|             |                          |             |                       |            |                           |
|             | TOTAL OF ALL UNIT PRICES |             | (use words)           | \$         | (dollars)                 |

As provided in paragraph 11.03 of the General Conditions, estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made by ENGINEER as provided in paragraph 9.08 of the General Conditions. Unit prices have been computed as provided in paragraph 11.03 of the General Conditions.

C. For all Work, at the prices stated in CONTRACTOR's Bid, attached hereto as an exhibit.

## **ARTICLE 6 - PAYMENT PROCEDURES**

#### 6.01 Submittal and Processing of Payments

A. CONTRACTOR shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by ENGINEER as provided in the General Conditions.

## 6.02 Progress Payments; Retainage

A. OWNER shall make progress payments on account of the Contract Price on the basis of CONTRACTOR's Applications for Payment on or about the date established at the pre-construction conference for each month during performance of the Work as provided in paragraphs 6.02.A. 1 and 6.02.A.2 below. All such payments will be measured by the schedule of values established in paragraph 2.07.A of the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the General Requirements.

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as ENGINEER may determine or OWNER may withhold, in accordance with paragraph 14.02 of the General Conditions:

- a. 95 % of Work completed (with the balance being retainage); and
- b. 95% of cost of materials and equipment not incorporated in the Work but delivered and suitably stored in a location and manner agreed to in writing and pursuant to paragraph 14.02.A.1 of the General Conditions (with the balance being retainage).

## 6.03 Final Payment

A. Upon final completion and acceptance of the Work in accordance with paragraph 14.07 of the General Conditions, OWNER shall pay the remainder of the Contract Price as recommended by ENGINEER as provided in said paragraph 14.07.

## **ARTICLE 7 - INTEREST**

7.01 All moneys not paid when due as provided in Article 14 of the General Conditions shall bear interest at the rate of  $8^{-}$ % per annum.

## **ARTICLE 8 - CONTRACTOR'S REPRESENTATIONS**

8.01 In order to induce OWNER to enter into this Agreement CONTRACTOR makes the following representations:

A. CONTRACTOR has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.

B. CONTRACTOR has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. CONTRACTOR is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.

D. CONTRACTOR has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in paragraph 4.02 of the General Conditions and (2) reports and drawings of a Hazardous Environmental Condition, if any, at the Site which has been identified in the Supplementary Conditions.

E. CONTRACTOR has obtained and carefully studied (or assumes responsibility for having done 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 CONTRACTOR, including applying the specific means, methods, techniques, sequences, and procedures of construction, if any, expressly required by the Contract Documents to be employed by CONTRACTOR, and safety precautions and programs incident thereto.

F. CONTRACTOR does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.

G. CONTRACTOR is aware of the general nature of work to be performed by OWNER and others at the Site to the Work as indicated in the Contract Documents.

H. CONTRACTOR has correlated the information known to CONTRACTOR, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.

I. 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.

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

## **ARTICLE 9 - CONTRACT DOCUMENTS**

#### 9.01 Contents

- A. The Contract Documents consist of the following:
- 1. This Agreement (pages 1 to \_\_\_\_\_, inclusive); 2. Performance Bond (pages \_\_\_\_\_\_ to \_\_\_\_\_, inclusive); 3. Payment Bond (pages \_\_\_\_\_\_ to \_\_\_\_\_, inclusive); 4. Other Bonds (pages to , inclusive); a. \_\_\_\_\_ (pages \_\_\_\_\_ to \_\_\_\_\_ inclusive); b. \_\_\_\_\_ (pages \_\_\_\_\_ to \_\_\_\_\_ inclusive); c. \_\_\_\_\_\_ (pages \_\_\_\_\_\_ to \_\_\_\_\_\_ inclusive); 5. General Conditions (pages \_\_\_\_\_\_ to \_\_\_\_\_, inclusive); 6. Supplementary Conditions (pages \_\_\_\_\_\_ to \_\_\_\_\_, inclusive); 7. Specifications as listed in the table of contents of the Project Manual; 8. Drawings consisting of a cover sheet and sheets numbered \_\_\_\_\_\_ through \_\_\_\_\_, inclusive, with each sheet bearing the following general title: 9. Addenda (numbers \_\_\_\_\_\_ to \_\_\_\_\_ inclusive); 10. Exhibits to this Agreement (enumerated as follows): Notice to Proceed (pages \_\_\_\_\_\_ to \_\_\_\_\_ inclusive); a. CONTRACTOR's Bid (pages \_\_\_\_\_\_ to \_\_\_\_\_, inclusive); b. Documentation submitted by CONTRACTOR prior to Notice of Award (pages \_\_\_\_\_ to \_\_\_\_\_ inclusive); с. d. 11. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto: a. Written Amendments; b. Work Change Directives;
  - Change Order(s).

c.

Β. The documents listed in paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above).

C. There are no Contract Documents other than those listed above in this Article 9.

The Contract Documents may only be amended, modified, or supplemented as provided in paragraph 3.05 of the D. General Conditions.

## **ARTICLE 10 - MISCELLANEOUS**

10.01 Terms

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

#### 10.02 Assignment of Contract

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

#### 10.03 Successors and Assigns

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

#### 10.04 Severability

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

10.05 Other Provisions

## **ARTICLE 3 - ENGINEER**

#### 3.01 The Project has been designed by Green Engineering, P.L.L.C.

who is hereinafter called ENGINEER and who is to act as OWNER's representative, assume all duties and responsibilities, and have the rights and authority assigned to ENGINEER in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

## **ARTICLE 4 – CONTRACT TIMES**

## 4.01 *Time of the Essence*

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

## 4.02 Days to Achieve Substantial Completion

The Work will be substantially completed within <u>360</u> calendar days after the date when the Contract Time commences to run as provided in paragraph 2.03 of the General Conditions for each of the following contracts:

#### 4.03 Liquidated Damages

A. CONTRACTOR and OWNER recognize that time is of the essence of this Agreement and that OWNER will suffer financial loss if the Work is not completed within the time(s) specified in paragraph 4.02 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by OWNER if the Work is not completed on time. Accordingly, instead of requiring any such proof, OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty), CONTRACTOR shall pay OWNER <u>\$500.00</u> for each day that expires after the time specified in paragraph 4.02 for Substantial Completion until the Work is substantially complete.

#### **ARTICLE 5 - CONTRACT PRICE**

5.01 OWNER shall pay CONTRACTOR for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the amounts determined pursuant to paragraphs 5.01.A, 5.01.B, and 5.01.C below:

A. For all Work other than Unit Price Work, a Lump Sum of:

|             | (\$)     |
|-------------|----------|
| (use words) | (figure) |

All specific cash allowances are included in the above price and have been computed in accordance with paragraph 11.02 of the General Conditions.

B. For all Unit Price Work, an amount equal to the sum of the established unit price for each separately identified item of Unit Price Work times the estimated quantity of that item as indicated in this paragraph 5.01.B:

## **UNIT PRICE WORK**

| <u>No</u> . | Item                     | <u>Unit</u> | Estimated<br>Quantity | Unit Price | Total<br><u>Estimated</u> |
|-------------|--------------------------|-------------|-----------------------|------------|---------------------------|
|             |                          |             |                       |            |                           |
|             |                          |             |                       |            |                           |
|             | TOTAL OF ALL UNIT PRICES |             |                       | \$         | (dollars)                 |
|             | TOTAL OF ALL UNIT PRICES |             | (use words)           | φ          | (uonars)                  |

As provided in paragraph 11.03 of the General Conditions, estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made by ENGINEER as provided in paragraph 9.08 of the General Conditions. Unit prices have been computed as provided in paragraph 11.03 of the General Conditions.

C. For all Work, at the prices stated in CONTRACTOR's Bid, attached hereto as an exhibit.

## **ARTICLE 6 - PAYMENT PROCEDURES**

#### 6.01 Submittal and Processing of Payments

A. CONTRACTOR shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by ENGINEER as provided in the General Conditions.

## 6.02 Progress Payments; Retainage

A. OWNER shall make progress payments on account of the Contract Price on the basis of CONTRACTOR's Applications for Payment on or about the date established at the pre-construction conference for each month during performance of the Work as provided in paragraphs 6.02.A. 1 and 6.02.A.2 below. All such payments will be measured by the schedule of values established in paragraph 2.07.A of the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the General Requirements.

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as ENGINEER may determine or OWNER may withhold, in accordance with paragraph 14.02 of the General Conditions:

- a. 95 % of Work completed (with the balance being retainage); and
- b. 95% of cost of materials and equipment not incorporated in the Work but delivered and suitably stored in a location and manner agreed to in writing and pursuant to paragraph 14.02.A.1 of the General Conditions (with the balance being retainage).

#### 6.03 Final Payment

A. Upon final completion and acceptance of the Work in accordance with paragraph 14.07 of the General Conditions, OWNER shall pay the remainder of the Contract Price as recommended by ENGINEER as provided in said paragraph 14.07.

## **ARTICLE 7 - INTEREST**

7.01 All moneys not paid when due as provided in Article 14 of the General Conditions shall bear interest at the rate of  $\underline{8}$  % per annum.

## **ARTICLE 8 - CONTRACTOR'S REPRESENTATIONS**

8.01 In order to induce OWNER to enter into this Agreement CONTRACTOR makes the following representations:

A. CONTRACTOR has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.

B. CONTRACTOR has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. CONTRACTOR is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.

D. CONTRACTOR has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in paragraph 4.02 of the General Conditions and (2) reports and drawings of a Hazardous Environmental Condition, if any, at the Site which has been identified in the Supplementary Conditions.

E. CONTRACTOR has obtained and carefully studied (or assumes responsibility for having done 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 CONTRACTOR, including applying the specific means, methods, techniques, sequences, and procedures of construction, if any, expressly required by the Contract Documents to be employed by CONTRACTOR, and safety precautions and programs incident thereto.

F. CONTRACTOR does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.

G. CONTRACTOR is aware of the general nature of work to be performed by OWNER and others at the Site to the Work as indicated in the Contract Documents.

H. CONTRACTOR has correlated the information known to CONTRACTOR, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.

I. 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.

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

## **ARTICLE 9 - CONTRACT DOCUMENTS**

## 9.01 Contents

| А.   | The  | e Cont        | ract Documents consist of the following:  |
|------|------|---------------|---|
|      | 1.   | This A        | greement (pages 1 to, inclusive);   |
|      | 2.   | Perfor        | nance Bond (pages to, inclusive);   |
|      | 3.   | Payme         | nt Bond (pages to, inclusive);  |
|      | 4.   | Other         | Bonds (pages to, inclusive);  |
|      |      | a             | (pages to inclusive);   |
|      |      | b             | (pages to inclusive);   |
|      |      | c             | (pages to inclusive);   |
|      | 5.   | Genera        | al Conditions (pages to, inclusive);  |
|      | 6.   | Supple        | mentary Conditions (pages to, inclusive);   |
|      | 7.   | Specif        | cations as listed in the table of contents of the Project Manual;   |
| she  |      |               | ngs consisting of a cover sheet and sheets numbered through, inclusive, with each ne following general title: |
|      | 9.   | Adde          | enda (numbers to inclusive);  |
|      | 10.  | Exh           | bits to this Agreement (enumerated as follows):   |
|      |      | a.            | Notice to Proceed (pages to inclusive);   |
|      |      | b.            | CONTRACTOR's Bid (pages to, inclusive);   |
|      |      | c.            | Documentation submitted by CONTRACTOR prior to Notice of Award (pages to inclusive                            |
|      |      | d.            |   |
| atta |      | The<br>hereto | following which may be delivered or issued on or after the Effective Date of the Agreement and are not        |
| atta | eneu | a.            | Written Amendments;   |
|      |      | b.            | Work Change Directives;   |
|      |      | c.            | Change Order(s).  |
| B.   | The  | docui         | nents listed in paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above).  |

C. There are no Contract Documents other than those listed above in this Article 9.

D. The Contract Documents may only be amended, modified, or supplemented as provided in paragraph 3.05 of the General Conditions.

## **ARTICLE 10 - MISCELLANEOUS**

#### 10.01 Terms

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

#### 10.02 Assignment of Contract

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

#### 10.03 Successors and Assigns

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

#### 10.04 Severability

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

10.05 Other Provisions

IN WITNESS WHEREOF, OWNER and CONTRACTOR have signed this Agreement in triplicate. One counterpart each has been delivered to OWNER, CONTRACTOR and ENGINEER. All portions of the Contract Documents have been signed, initialed or identified by OWNER and CONTRACTOR or identified by ENGINEER on their behalf.

| This Agreement will be effective on,,  | (which is the Effective Date of the Agreement).  |
|--|--|
| OWNER:   | CONTRACTOR:  |
| By:  | By:  |
| [CORPORATE SEAL]   | [CORPORATE SEAL]   |
| Attest   | Attest   |
| Address for giving notices:  | Address for giving notices:  |
| If OWNER is a public body, attach evidence of  |  |
| authority to sign and resolution or other documents<br>authorizing execution of OWNER-CONTRACTOR<br>Agreement.)<br><i>"THIS INSTRUMENT HAS BEEN PREAUDITED IN THE<br/>MANNER REQUIRED BY THE LOCAL GOVERNMENT<br/>BUDGET AND FISCAL CONTROL ACT"</i> | License No(Where applicable) Agent for service of process:                               |
| Finance Director   | (If CONTRACTOR is a corporation or a partnership, attach evidence of authority to sign.) |
| Designated Representative:   | Designated Representative:   |
| Name:  | Name:  |
| Title:   | Title:   |
| Address:   | Address:   |
| Phone:   | Phone:   |
| Facsimile:   | Facsimile:   |
| AGENCY Concurrence   | ract, and without liability for any payments thereunder, the AGENCY                      |
| By:  | Title:   |

AGENCY Official

Date:

## **Performance Bond**

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

CONTRACTOR (Name and Address):

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

OWNER (Name and Address):

CONTRACT Date: Amount: Description (Name and Location):

BOND Date (Not earlier than Contract Date): Amount: Modifications to this Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Performance Bond to be duly executed on its behalf by its authorized officer, agent or representative.

| CONTRACTOR AS PRINCIPAL<br>Company:    | (Corp. Seal)                | SURETY<br>Company:  | (Corp. Seal) |
|--|-----------------------------|---|--------------|
| Signature:<br>Name and Title:          |                             | Signature:<br>Name and Title:<br>(Attach Power of Attorney) |              |
| (Space is provided below for signature | es of additional parties, i | f required.)  |              |
| CONTRACTOR AS PRINCIPAL<br>Company:    | (Corp. Seal)                | SURETY<br>Company:  | (Corp. Seal) |
| Signature:                             |                             | Signature:  |              |

Name and Title:

EJCDC No. 1910-28-A (1996 Edition)

Originally prepared through the joint efforts of the Surety Association of America, Engineers Joint Contract Documents Committee, the Associated General Contractors of America, and the American Institute of Architects.

Name and Title:

1. The CONTRACTOR and the Surety, jointly and severally, bind themselves, notice the OWNER shall be entitled to enforce any remedy available to the their heirs, executors, administrators, successors and assigns to the Owner for the OWNER. performance of the Contract, which is incorporated herein by reference.

2. If the CONTRACTOR performs the Contract, the Surety and the CONTRACTOR have no obligation under this Bond, except to participate in conferences as provided in paragraph 3.1.

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

- 3.1. The OWNER has notified the CONTRACTOR and the Surety at the addresses described in paragraph 10 below, that the OWNER is considering declaring a CONTRACTOR Default and has requested and attempted to arrange a conference with the CONTRACTOR and the Surety to be held not later than fifteen days after receipt of such notice to discuss methods of performing the Contract. If the OWNER, the CONTRACTOR and the Surety agree, the CONTRACTOR shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive the OWNER's right, if any, subsequently to declare a CONTRACTOR Default; and
- 3.2. The OWNER has declared a CONTRACTOR Default and formally terminated the CONTRACTOR's right to complete the Contract. Such CONTRACTOR Default shall not be declared earlier than twenty days after the CONTRACTOR and the Surety have received notice as provided in paragraph 3.1; and
- The OWNER has agreed to pay the Balance of the Contract Price to: 3.3.
  - 3.3.1. The Surety in accordance with the terms of the Contract;
  - 3.3.2. Another contractor selected pursuant to paragraph 4.3 to perform the Contract.

4. When the OWNER has satisfied the conditions of paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

- Arrange for the CONTRACTOR, with consent of the OWNER, to 4.1. perform and complete the Contract; or
- 4.2. Undertake to perform and complete the Contract itself, through its agents or through independent contractors; or
- 4.3. Obtain bids or negotiated proposals from qualified contractors acceptable to the OWNER for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by the OWNER and the contractor selected with the OWNER's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the Bonds issued on the Contract, and pay to the OWNER the amount of damages as described in paragraph 6 in excess of the Balance of the Contract Price incurred by the OWNER resulting from the CONTRACTOR Default; or
- Waive its right to perform and complete, arrange for completion, or 4.4. obtain a new contractor and with reasonable promptness under the circumstances:
  - 4.4.1 After investigation, determine the amount for which it may be liable to the OWNER and, as soon as practicable after the amount is determined, tender payment therefor to the OWNER;
  - 4.4.2 Deny liability in whole or in part and notify the OWNER citing reasons therefor.

5. If the Surety does not proceed as provided in paragraph 4 with reasonable promptness, the Surety shall be deemed to be in default on this Bond fifteen days after receipt of an additional written notice from the OWNER to the Surety demanding that the Surety perform its obligations under this Bond, and the OWNER shall be entitled to enforce any remedy available to the OWNER. If the Surety proceeds as provided in paragraph 4.4, and the OWNER refuses the payment tendered or the Surety has denied pliability, in whole or in part, without further

6. After the OWNER has terminated the CONTRACTOR's right to complete the Contract, and if the Surety elects to act under paragraph 4.1, 4.2, or 4.3 above, then the responsibilities of the Surety to the OWNER shall not be greater than those of the CONTRACTOR under the Contract, and the responsibilities of the OWNER to the Surety shall not be greater than those of the OWNER under the Contract. To a limit of the amount of this Bond, but subject to commitment by the OWNER of the Balance of the Contract Price to mitigation of costs and damages on the Contract, the Surety is obligated without duplication for:

- The responsibilities of the CONTRACTOR for correction of defective 6.1. Work and completion of the Contract;
- 6.2. Additional legal, design professional and delay costs resulting from the CONTRACTOR's Default, and resulting from the actions or failure to act of the Surety under paragraph 4; and
- 6.3. Liquidated damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or nonperformance of the CONTRACTOR.

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

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

9. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the Work or part of the Work is located and shall be instituted within two years after CONTRACTOR Default or within two years after the CONTRACTOR ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

10. Notice to the Surety, the OWNER or the CONTRACTOR shall be mailed or delivered to the address shown on the signature page.

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

- 12. Definitions.
  - 12.1 Balance of the Contract Price: The total amount payable by the OWNER to the CONTRACTOR under the Contract after all proper adjustments have been made, including allowance to the CONTRACTOR of any amounts received or to be received by the OWNER in settlement of insurance or other Claims for damages to which the CONTRACTOR is entitled, reduced by all valid and proper payments made to or on behalf of the CONTRACTOR under the Contract.
  - 12.2. Contract: The agreement between the OWNER and the CONTRACTOR identified on the signature page, including all Contract Documents and changes thereto.
  - 12.3. CONTRACTOR Default: Failure of the CONTRACTOR, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.
  - OWNER Default: Failure of the OWNER, which has neither been 12.4. remedied nor waived, to pay the CONTRACTOR as required by the Contract or to perform and complete or comply with the other terms thereof.

## **Payment Bond**

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

CONTRACTOR (Name and Address):

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

OWNER (Name and Address):

CONTRACT Date: Amount: Description (Name and Location):

BOND Date (Not earlier than Contract Date): Amount: Modifications to this Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Payment Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

SURFTY

CONTRACTOR AS PRINCIPAL

| Company:                      | (Corp. Seal)                                | Company:  | (Corp. Seal) |
|-------------------------------|---|---|--------------|
| Signature:<br>Name and Title: |   | Signature:<br>Name and Title:<br>(Attach Power of Attorney) |              |
| (Space is provided below for  | signatures of additional parties, if requir | ed.)  |              |
|                               | DAT   |   |              |

| Company:                      | (Corp. Seal) | Company:                      | (Corp. Seal) |
|-------------------------------|--------------|-------------------------------|--------------|
| Signature:<br>Name and Title: |              | Signature:<br>Name and Title: |              |

EJCDC No. 1910-28-B (1996 Edition)

Originally prepared through the joint efforts of the Surety Association of America, Engineers Joint Contract Documents Committee, the Associated General Contractors of America, the American Institute of Architects, the American Subcontractors Association, and the Associated Specialty Contractors.

1. The CONTRACTOR and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the OWNER to pay for labor, materials and equipment furnished for use in the performance of the Contract, which is incorporated herein by reference.

2. With respect to the OWNER, this obligation shall be null and void if the CONTRACTOR:

- 2.1. Promptly makes payment, directly or indirectly, for all sums due Claimants, and
- 2.2. Defends, indemnifies and holds harmless the OWNER from all claims, demands, liens or suits by any person or entity who furnished labor, materials or equipment for use in the performance of the Contract, provided the OWNER has promptly notified the CONTRACTOR and the Surety (at the addresses described in paragraph 12) of any claims, demands, liens or suits and tendered defense of such claims, demands, liens or suits to the CONTRACTOR and the Surety, and provided there is no OWNER Default.

3. With respect to Claimants, this obligation shall be null and void if the CONTRACTOR promptly makes payment, directly or indirectly, for all sums due.

4. The Surety shall have no obligation to Claimants under this Bond until:

- 4.1. Claimants who are employed by or have a direct contract with the CONTRACTOR have given notice to the Surety (at the addresses described in paragraph 12) and sent a copy, or notice thereof, to the OWNER, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.
- 4.2. Claimants who do not have a direct contract with the CONTRACTOR:
  - Have furnished written notice to the CONTRACTOR and sent a copy, or notice thereof, to the OWNER, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials were furnished or supplied or for whom the labor was done or performed; and
  - Have either received a rejection in whole or in part from the CONTRACTOR, or not received within 30 days of furnishing the above notice any communication from the CONTRACTOR by which the CONTRACTOR had indicated the claim will be paid directly or indirectly; and
  - 3. Not having been paid within the above 30 days, have sent a written notice to the Surety and sent a copy, or notice thereof, to the OWNER, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to the CONTRACTOR.

5. If a notice required by paragraph 4 is given by the OWNER to the CONTRACTOR or to the Surety, that is sufficient compliance.

6. When the Claimant has satisfied the conditions of paragraph 4, the Surety shall promptly and at the Surety's expense take the following actions:

- 6.1. Send an answer to the Claimant, with a copy to the OWNER, within 45 days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.
- 6.2. Pay or arrange for payment of any undisputed amounts.

7. The Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

8. Amounts owed by the OWNER to the CONTRACTOR under the Contract shall be used for the performance of the Contract and to satisfy claims, if any, under any Performance Bond. By the CONTRACTOR furnishing and the OWNER accepting this Bond, they agree that all funds earned by the CONTRACTOR in the performance of the Contract are dedicated to satisfy obligations of the CONTRACTOR and the Surety under this Bond, subject to the OWNER's priority to use the funds for the completion of the Work.

## PAYMENT BOND: 2 OF 2

9. The Surety shall not be liable to the OWNER, Claimants or others for obligations of the CONTRACTOR that are unrelated to the Contract. The OWNER shall not be liable for payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.

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

11. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the Work or part of the Work is located or after the expiration of one year from the date (1) on which the Claimant gave the notice required by paragraph 4.1 or paragraph 4.2.3, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to the Surety, the OWNER or the CONTRACTOR shall be mailed or delivered to the addresses shown on the signature page. Actual receipt of notice by Surety, the OWNER or the CONTRACTOR, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.

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

14. Upon request of any person or entity appearing to be a potential beneficiary of this Bond, the CONTRACTOR shall promptly furnish a copy of this Bond or shall permit a copy to be made.

- 15. DEFINITIONS
  - 15.1. Claimant: An individual or entity having a direct contract with the CONTRACTOR or with a Subcontractor of the CONTRACTOR to furnish labor, materials or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Contract, architectural and engineering services required for performance of the Work of the CONTRACTOR and the CONTRACTOR's Subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.
  - 15.2. Contract: The agreement between the OWNER and the CONTRACTOR identified on the signature page, including all Contract Documents and changes thereto.
  - 15.3. OWNER Default: Failure of the OWNER, which has neither been remedied nor waived, to pay the CONTRACTOR as required by the Contract or to perform and complete or comply with the other terms thereof.

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 Law.

## STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT FUNDING AGENCY EDITION

Prepared by

### ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly By





AMERICAN CONSULTING ENGINEERS COUNCIL



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This document has been accepted by United States Department of Agriculture Rural Utilities Service, Water and Waste Programs

These General Conditions have been prepared for use with the Owner-Contractor Agreement (No. 1910-8-A-1-FA) (1997 Edition). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the EJCDC User's Guide (No. 1910-50), which is a looseleaf compilation of narratives being produced over a five year period. For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (No. 1910-17) (1996 Edition).

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## ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

#### 1.01 Defined Terms

A. Wherever used in Contract Documents and printed with initial or all capital letter, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof.

1. *Addenda--*Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the Contract Documents.

2. *AGENCY*--The Federal or state agency named as such in the Agreement.

3. *Agreement*—The written instrument which is evidence of the agreement between OWNER and CONTRACTOR covering the Work.

4. *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.

5. *Asbestos--*Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United State Occupational Safety and Health Administration.

6. *Bid*--The offer or proposal of a bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

7. *Bidding Documents--*The Bidding Requirements and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids).

8. *Bidding Requirements*--The Advertisement or Invitation to Bid, Instructions to Bidders, Bid security form, if any, and the Bid form with any supplements.

9. *Bonds*--Performance and payment bonds and other instruments of security.

10. Change Order--A document recommended by ENGINEER which is signed by CONTRACTOR and OWNER and AGENCY and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.

11. *Claim--*A demand or assertion by OWNER or CONTRACTOR seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.

12. *Contract*--The entire and integrated written agreement between the OWNER and CONTRACTOR concerning the Work. The Contract supersedes prior negotiations, representations, or agreements whether written or oral.

Documents--The 13. Contract Contract Documents establish the rights and obligations of the parties and include the Agreement, Addenda (which pertain to the Contract Documents), CONTRACTOR's Bid (including documentation accompanying the Bid and any post Bid documentation submitted prior to the Notice of Award), the Notice to Proceed, the Bonds, these General Conditions, Supplementary Conditions, the the Specifications and the Drawings as the same are more specifically identified in the Agreement, together with all Written Amendments, Change Orders, and ENGINEER's written interpretations and clarifications issued on or after the Effective Date of the Agreement. Approved Shop Drawings and the reports and drawings of subsurface and physical conditions are not Contract Documents. Only printed or hard copies of the items listed in this paragraph are Contract Documents. Files in electronic media format of text, data, graphics, and the like that may be furnished by OWNER to CONTRACTOR are not Contract Documents.

14. *Contract Price--*The moneys payable by OWNER to CONTRACTOR for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of paragraph 11.03 in the case of Unit Price Work).

15. *Contract Times--*The number of days or the dates stated in the Agreement to: (i) achieve Substantial Completion; and, if applicable, (ii) complete the Work so that it is ready for final payment as evidenced by ENGINEER's written recommendation of final payment.

16. *CONTRACTOR*--The individual or entity with whom OWNER has entered into the Agreement.

17. *Cost of the Work--*See paragraph 11.01.A for definition.

18. *Drawings--*That part of the Contract Documents prepared or approved by ENGINEER which graphically shows the scope, extent, and character of the Work to be performed by CONTRACTOR. Shop Drawings and other CONTRACTOR submittals are not Drawings as so defined.

19. *Effective Date of the Agreement-*-The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

20. *ENGINEER*--The individual or entity named as such in the Agreement.

21. ENGINEER's Consultant--An Individual or entity having a Contract with ENGINEER to furnish services as ENGINEER's independent professional associate or consultant with respect to the Project and who is identified as such in the Supplementary Conditions.

22. *Field Order--*A written order issued by ENGINEER which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.

23. *General Requirements*--Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.

24. *Hazardous Environmental Condition*--The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto in connection with the Work.

25. *Hazardous Waste-*The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.

26. Laws and Regulations; Laws or Regulations--Any and all applicable laws, rules, regulations, ordinances, codes and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

27. *Liens--*Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

28. *Milestone--*A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

29. *Notice of Award--*The written notice by OWNER to the apparent successful bidder stating that upon timely compliance by the apparent successful bidder with the conditions precedent listed therein, OWNER will sign and deliver the Agreement.

30. *Notice to Proceed--*A written notice given by OWNER to CONTRACTOR fixing the date on which the Contract Times will commence to run and on which CONTRACTOR shall start to perform the Work under the Contract Documents.

31. *OWNER*--The individual, entity, public body, or authority with whom CONTRACTOR has entered into the Agreement and for whom the Work is to be performed.

32. *Partial Utilization--*Use by OWNER of a substantially completed part of the Work for the purpose for which it is intended (or a related purpose) prior to Substantial Completion of all the Work.

33. *PCBs*--Polychlorinated biphenyls.

34. *Petroleum*--Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and

pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.

35. *Project*--The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part as may be indicated elsewhere in the Contract Documents.

36. *Project Manual*--The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.

37. Radioactive Material--Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

38. *Resident Project Representative*--The authorized representative of ENGINEER who may be assigned to the Site or any part thereof.

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

40. Shop Drawings--All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for CONTRACTOR and submitted by CONTRACTOR to illustrate some portion of the Work.

41. *Site*--Lands or areas indicated in the Contract Documents as being furnished by OWNER upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by OWNER which are designated for the use of CONTRACTOR.

42. *Specifications--*That part of the Contract Documents consisting of written technical descriptions of materials, equipment, systems, standards, and workmanship as applied

to the Work and certain administrative details applicable thereto.

43. *Subcontractor*--An individual or entity having a direct contract with CONTRACTOR or with any other Subcontractor for the performance of a part of the Work at the Site.

44. Substantial Completion--The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of ENGINEER, the Work 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.

45. *Supplementary Conditions--*That part of the Contract Documents which amends or supplements these General Conditions.

46. *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 any Subcontractor.

47. Underground Facilities--All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing facilities, such including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

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

49. *Work*--The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

50. Work Change Directive--A written statement to CONTRACTOR issued on or after the Effective Date of the Agreement and signed by OWNER and AGENCY upon recommendation of the ENGINEER ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

51. Written Amendment--A written statement modifying the Contract Documents, signed by OWNER, CONTRACTOR, and AGENCY upon recommendation of ENGINEER on or after the Effective Date of the Agreement and normally dealing with the nonengineering or nontechnical rather than strictly construction-related aspects of the Contract Documents.

## 1.02 Terminology

#### A. Intent of Certain Terms or Adjectives

1. Whenever in the Contract Documents the terms "as allowed," "as approved," or terms of like effect or import are used, or 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 action or determination will be solely to evaluate, in general, the completed Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating The use of any such term or otherwise). adjective shall not be effective to assign to ENGINEER any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of paragraph 9.10 or any other provision of the Contract Documents.

## B. Day

1. The word "day" shall constitute a calendar day of 24 hours measured from midnight to the next midnight.

## C. Defective

The word "defective," 1. when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it does not conform to the Contract Documents or does not meet the requirements of any inspection, reference standard, test, or approval referred to in the Contract Documents, or has ENGINEER's damaged prior to been recommendation of final payment (unless responsibility for the protection thereof has been assumed by OWNER at Substantial Completion in accordance with paragraph 14.04 or 14.05).

## D. Furnish, Install, Perform, Provide

1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.

4. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of CONTRACTOR, "provide" is implied.

E. Unless stated otherwise in the Contract Documents, words or phrases which have a wellknown technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

#### **ARTICLE 2 - PRELIMINARY MATTERS**

#### 2.01 Delivery of Bonds

A. When CONTRACTOR delivers the executed Agreements to OWNER, CONTRACTOR shall also deliver to OWNER such Bonds as CONTRACTOR may be required to furnish.

#### 2.02 Copies of Documents

A. OWNER shall furnish to CONTRACTOR up to five copies of the Contract Documents. Additional copies will be furnished upon request at the cost of reproduction.

# 2.03 Commencement of Contract Times; Notice to Proceed

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

## 2.04 Starting the Work

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

#### 2.05 Before Starting Construction

A. Contractor's Review of Contract Documents: Before undertaking each part of the Work, CONTRACTOR shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. CONTRACTOR shall promptly report in writing to ENGINEER any conflict, error, ambiguity, or discrepancy which CONTRACTOR may discover and shall obtain a written interpretation or clarification from ENGINEER before proceeding with any Work affected thereby; however, 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 knew or reasonably should have known thereof.

B. *Preliminary Schedules:* Within ten days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), CONTRACTOR shall submit to ENGINEER for its timely review:

1. a preliminary progress schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;

2. a preliminary schedule of Shop Drawing and Sample submittals which will list each required submittal and the times for submitting, reviewing, and processing such submittal; 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 performances of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

C. Evidence of Insurance: Before any Work at the Site is started, CONTRACTOR and OWNER shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which CONTRACTOR and OWNER respectively are required to purchase and maintain in accordance with Article 5.

#### 2.06 Preconstruction Conference

A. Before any Work at the Site is started, a conference attended by CONTRACTOR, ENGINEER, AGENCY and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in paragraph 2.05.B, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.

#### 2.07 Initial Acceptance of Schedules

A. Unless otherwise provided in the Contract Documents, at least ten 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 2.05.B. CONTRACTOR shall have an additional ten 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 any specified Milestones and 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 Shop Drawing and Sample submittals will be acceptable to ENGINEER if it provides a workable arrangement for reviewing and processing the required submittals.

3. CONTRACTOR's schedule of values will be acceptable to ENGINEER as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 Intent

A. The Contract Documents are complementary; what is called for by one is as binding as if called for 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. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be provided whether or not specifically called for at no additional cost to OWNER.

C. Clarifications and interpretations of the Contract Documents shall be issued by ENGINEER as provided in Article 9.

#### 3.02 Reference Standards

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

1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

2. No provision of any such standard, specification, manual or code, or any instruction of a Supplier shall be effective to change the responsibilities of OWNER, duties or CONTRACTOR, or ENGINEER, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents, nor shall any such provision or instruction be effective to assign to OWNER, ENGINEER, or any of ENGINEER's Consultants, agents, or employees any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

#### 3.03 Reporting and Resolving Discrepancies

#### A. Reporting Discrepancies

1. If, during the performance of the Work, CONTRACTOR discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any Law or Regulation applicable to the performance of the Work or of any standard, specification, manual or code, or of any instruction of any Supplier, CONTRACTOR shall report it to ENGINEER in writing at once. CONTRACTOR shall not proceed with the Work affected thereby (except in an emergency as required by paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in paragraph 3.04; provided, however, that CONTRACTOR shall not be liable to OWNER or ENGINEER for failure to report any such conflict, error, ambiguity, or discrepancy unless CONTRACTOR knew or reasonably should have known thereof.

#### B. Resolving Discrepancies

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and ;

> a. the provisions of any standard, specification, manual, code, or instruction (whether or not specifically incorporated by reference in the Contract Documents); or

b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

## 3.04 Amending and Supplementing Contract Documents

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof in one or more of the following ways; (i) a Written Amendment; (ii) a Change Order; or (iii) a Work Change Directive.

B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways; (i) a Field Order; (ii) ENGINEER's approval of a Shop Drawing or Sample; or (iii) ENGINEER's written interpretation or clarification.

#### 3.05 Reuse of Documents

A. CONTRACTOR and any Subcontractor or Supplier or other individual or entity performing or furnishing any of the Work under a direct or indirect contract with OWNER: (i) shall not 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 ENGINEER's Consultant. including electronic media editions; and (ii) shall not reuse any of such Drawings, Specifications, other documents, or copies on extensions of the Project or any other project without written consent of OWNER and ENGINEER and specific written verification or adoption by ENGINEER. This prohibition will survive final payment, completion, and acceptance of the Work, or termination or completion of the Contract. Nothing herein shall preclude CONTRACTOR from retaining copies of the Contract Documents for record purposes.

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

#### 4.01 Availability of Lands

A. OWNER shall furnish the Site. OWNER shall notify CONTRACTOR of any encumbrances or restrictions not of general application but specifically related to use of the Site with which CONTRACTOR must comply in performing the Work. OWNER will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If CONTRACTOR and OWNER are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in OWNER's furnishing the Site, CONTRACTOR may make a Claim therefor as provided in paragraph 10.05.

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

C. CONTRACTOR shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

#### 4.02 Subsurface and Physical Conditions

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

1. those reports of explorations and tests of subsurface conditions at or contiguous to the Site that ENGINEER has used in preparing the Contract Documents; and

2. those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) that ENGINEER has used in preparing the Contract Documents.

B. Limited Reliance by CONTRACTOR on Technical Data Authorized: CONTRACTOR may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," CONTRACTOR may not rely upon or make any Claim against OWNER, ENGINEER, or any of ENGINEER's Consultants 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.

## 4.03 Differing Subsurface or Physical Conditions

A. *Notice:* If CONTRACTOR believes that any subsurface or physical condition at or contiguous to the Site that is uncovered or revealed either:

1. is of such a nature as to establish that any "technical data" on which CONTRACTOR is entitled to rely as provided in paragraph 4.02 is materially inaccurate; or 2. is of such a nature as to require a change in the Contract Documents; or

3. differs materially from that shown or indicated in the Contract Documents; or

4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents; then CONTRACTOR shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by paragraph 6.16.A), notify OWNER and ENGINEER in writing about such condition. CONTRACTOR shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. *ENGINEER's Review*: After receipt of written notice as required by paragraph 4.03.A, ENGINEER will promptly review the pertinent condition, determine the necessity of OWNER's obtaining additional exploration or tests with respect thereto, and advise OWNER in writing (with a copy to CONTRACTOR) of ENGINEER's findings and conclusions.

#### C. Possible Price and Times Adjustments

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in CONTRACTOR's cost of, or time required for, performance of the Work; subject, however, to the following:

> a. such condition must meet any one or more of the categories described in paragraph 4.03.A; and

> b. with respect to Work that is paid for on a Unit Price Basis, any adjustment in Contract Price will be subject to the provisions of paragraphs 9.08 and 11.03.

2. CONTRACTOR shall not be entitled to any adjustment in the Contract Price or Contract Times if:

a. CONTRACTOR knew of the existence of such conditions at the time CONTRACTOR made a final commitment to OWNER in respect of Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or

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

c. CONTRACTOR failed to give the written notice within the time and as required by paragraph 4.03.A.

3. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, or any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in paragraph 10.05. However, OWNER. ENGINEER, and ENGINEER's Consultants shall not be liable to CONTRACTOR for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by CONTRACTOR on or in connection with any other project or anticipated project.

#### 4.04 Underground Facilities

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

1. OWNER and ENGINEER shall not be responsible for the accuracy or completeness of any such information or data; and

2. the cost of all of the following will be included in the Contract Price, and CONTRACTOR shall have full responsibility for:

a. reviewing and checking all such information and data,

b. locating all Underground Facilities shown or indicated in the Contract Documents,

c. coordination of the Work with the Owners of such Underground Facilities, including OWNER, during construction, and

d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

#### B. Not Shown or Indicated:

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, CONTRACTOR shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to OWNER and ENGINEER. will ENGINEER promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, CONTRACTOR shall be responsible for the safety and protection of such Underground Facility.

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

## 4.05 Reference Points

A. OWNER shall provide engineering surveys to establish reference points for construction which in ENGINEER's judgement are necessary to enable CONTRACTOR to proceed with the Work. CONTRACTOR shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of OWNER. CONTRACTOR shall report to ENGINEER whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

## 4.06 Hazardous Environmental Condition at Site

A. *Reports and Drawings*: Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that have been utilized by the ENGINEER in the preparation of the Contract Documents.

B. Limited Reliance by CONTRACTOR or Technical Data Authorized: CONTRACTOR may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data", CONTRACTOR may not rely upon or make any Claim against OWNER, ENGINEER or any of ENGINEER's Consultants with respect to:

1. the completeness of such reports and drawings for CONTRACTOR's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by CONTRACTOR and safety precautions and programs incident thereto; or

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

3. any CONTRACTOR interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.

C. CONTRACTOR shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of Work. CONTRACTOR shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by CONTRACTOR, Subcontractors, Suppliers, or anyone else for whom CONTRACTOR is responsible.

D. If CONTRACTOR encounters a Hazardous Environmental Condition or if CONTRACTOR or anyone for whom CONTRACTOR is responsible creates a Hazardous Environmental Condition, CONTRACTOR shall immediately; (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by paragraph 6.16); and (iii) 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.

E. CONTRACTOR shall not be required to resume Work in connection with such condition or in any affected area until after OWNER has obtained any required permits related thereto and delivered to CONTRACTOR written notice: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If OWNER and CONTRACTOR cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by CONTRACTOR, either party may make a Claim therefor as provided in paragraph 10.05.

If after receipt of such written notice F. CONTRACTOR does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then OWNER may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If OWNER and CONTRACTOR cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in paragraph 10.05. OWNER may have such deleted portion of the Work performed by OWNER's own forces or others in accordance with Article 7.

G. To the fullest extent permitted by Laws and Regulations, OWNER shall indemnify and hold harmless CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants and the officers, directors, partners, employees, agents, other consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition; (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of Work, and (ii) was not created by CONTRACTOR or by anyone for whom CONTRACTOR is responsible. Nothing in this paragraph 4.06.E shall obligate OWNER to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

H. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees, agents, other consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers. architects. attorneys. and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by CONTRACTOR or by anyone for whom CONTRACTOR is responsible. Nothing in this paragraph 4.06.F shall obligate CONTRACTOR to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

I. The provisions of paragraphs 4.02, 4.03, and 4.04 are not intended to apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

# ARTICLE 5 – BONDS AND INSURANCE

# 5.01 Performance, Payment and Other Bonds

A. CONTRACTOR shall furnish performance and payment Bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all CONTRACTOR's obligations under the Contract Documents. These Bonds shall remain in effect at least until one year after the date when final payment becomes due, except as provided otherwise by Laws or Regulations or by the Contract Documents. CONTRACTOR shall also furnish such other Bonds as are required by the Contract Documents.

B. All Bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All Bonds signed by an agent must be accompanied by a certified copy of such agent's authority to act.

C. If the surety on any Bond furnished by CONTRACTOR is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of paragraph 5.01.B, CONTRACTOR shall within 20 days thereafter substitute another Bond and surety, both of which shall comply with the requirements of paragraphs 5.01.B and 5.02.

#### 5.02 Licensed Sureties and Insurers

A. All Bonds and insurance required by the Contract Documents to be purchased and maintained by OWNER or CONTRACTOR shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue Bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

#### 5.03 Certificates of Insurance

A. CONTRACTOR shall deliver to OWNER, with copies of each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by OWNER or any other additional insured) which CONTRACTOR is required to purchase and OWNER shall deliver maintain. to CONTRACTOR, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by CONTRACTOR or any other additional insured) which OWNER is required to purchase and maintain.

#### 5.04 CONTRACTOR's Liability Insurance

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

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;

2. claims for damages because of bodily injury, occupational sickness or disease, or death of CONTRACTOR's employees;

3. claims for damages because of bodily injury, sickness or disease, or death of any person other than CONTRACTOR's employees;

4. claims for damages insured by reasonably available personal injury liability coverage which are sustained: (i) by any person as a result of an offense directly or indirectly related to the employment of such person by CONTRACTOR, or (ii) by any person for any other reason; 5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and

6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

B. The policies of insurance so required by this paragraph 5.04 to be purchased and maintained shall:

1. with respect to insurance required by paragraphs 5.04.A.3 through 5.04.A.6 inclusive, include as additional insureds (subject to any customary exclusion in respect of professional liability) OWNER, ENGINEER, ENGINEER's Consultants, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

2. include at lease the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;

3. include completed operations insurance;

4. include contractual liability insurance covering CONTRACTOR's indemnity obligations under paragraphs 6.07, 6.11, and 6.20;

5. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to OWNER and CONTRACTOR and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the CONTRACTOR pursuant to paragraph 5.03 will so provide); 6. remain in effect at least until final payment and at all times thereafter when CONTRACTOR may be correcting, removing, or replacing defective Work in accordance with paragraph 13.07; and

7. with respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least vears after final payment (and two CONTRACTOR shall furnish OWNER and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to OWNER and any such additional insured of continuation of such insurance at final payment and one year thereafter).

#### 5.05 OWNER's Liability Insurance

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

# 5.06 Property Insurance

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

1. include the interests of OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an additional insured;

2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at lease include insurance for physical loss or damage to the Work, temporary buildings, false work, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss; fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, and such other perils or causes of loss as may be specifically required by the Supplementary Conditions;

3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);

4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by OWNER prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by ENGINEER;

5. allow for partial utilization of the Work by OWNER;

6. include testing and startup; and

7. be maintained in effect until final payment is made unless otherwise agreed to in writing by OWNER, CONTRACTOR, and ENGINEER with 30 days written notice to each other additional insured to whom a certificate of insurance has been issued.

8. contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to OWNER and CONTRACTOR and to each other additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with paragraph 5.07.

B. CONTRACTOR shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of OWNER, Subcontractors. ENGINEER, CONTRACTOR, ENGINEER's Consultants, and anv other or entities identified in the individuals Supplementary Conditions, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured.

OWNER shall not be responsible for C. purchasing and maintaining any property insurance specified in this paragraph 5.06 to protect the interests of CONTRACTOR, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by CONTRACTOR, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

# 5.07 Waiver of Rights

A. OWNER and CONTRACTOR intend that all policies purchased in accordance with paragraph 5.06 will protect OWNER, CONTRACTOR, Subcontractors. ENGINEER. ENGINEER's Consultants, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or additional insureds thereunder. OWNER and CONTRACTOR waive all rights against each other and their respective officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors, ENGINEER, ENGINEER's Consultants, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by OWNER as trustee or otherwise payable under any policy so issued.

B. OWNER waives all rights against CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees, agents and other 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 peril whether or not insured by OWNER; and

2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by OWNER during partial utilization pursuant to paragraph 14.05, after Substantial Completion pursuant to paragraph 14.04, or after final payment pursuant to paragraph 14.07.

C. Any insurance policy maintained by OWNER covering any loss, damage or consequential loss referred to in paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against CONTRACTOR, Subcontractors, ENGINEER, or ENGINEER's Consultants and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them.

# 5.08 Receipt and Application of Insurance Proceeds

A. Any insured loss under the policies of insurance required by paragraph 5.06 will be adjusted with CONTRACTOR and made payable to CONTRACTOR as fiduciary for the insureds, as their interests may appear subject to the requirements of any applicable mortgage clause and of paragraph 5.08.B. CONTRACTOR shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order or Written Amendment.

B. CONTRACTOR as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to CONTRACTOR's exercise of this power. If such objection be made, CONTRACTOR as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, CONTRACTOR as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, CONTRACTOR as fiduciary shall give bond for the proper performance of such duties.

# 5.09 Acceptance of Bonds and Insurance; Option to Replace

A. If either OWNER or CONTRACTOR has any objection to the coverage afforded by or other provisions of the Bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of nonconformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by paragraph 2.05.C. OWNER and CONTRACTOR shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the Bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent Bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

# 5.10 Partial Utilization, Acknowledgment of Property Insurer

A. If OWNER finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

# ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

# 6.01 Supervision and Superintendence

CONTRACTOR shall supervise, inspect, A. 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, but CONTRACTOR shall not be responsible for the negligence of OWNER or ENGINEER in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents. CONTRACTOR shall be responsible to see that the completed Work complies accurately with the Contract Documents.

B. At all times during the progress of the Work, CONTRACTOR shall assign a competent resident superintendent thereto who shall not be replaced without written notice to OWNER and ENGINEER except under extraordinary circumstances. The superintendent will be CONTRACTOR's representative at the Site and shall have authority to act on behalf of CONTRACTOR. All communications given to or received from the superintendent shall be binding on CONTRACTOR.

# 6.02 Labor; Working Hours

A. CONTRACTOR shall provide competent, suitably qualified personnel to survey, lay out, and construct the Work 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, and CONTRACTOR will not permit overtime work or the performance of Work on Saturday, Sunday, or any legal holiday without OWNER's written consent (which will not be unreasonably withheld) given after prior written notice to ENGINEER.

### 6.03 Services, Materials, and Equipment

A. Unless otherwise specified in the General Requirements, CONTRACTOR shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.

B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All warranties and guarantees specifically called for by the Specifications shall expressly run to the benefit If required by ENGINEER, of OWNER. CONTRACTOR shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

# 6.04 Progress Schedule

A. CONTRACTOR shall adhere to the progress schedule established in accordance with paragraph 2.07 as it may be adjusted from time to time as provided below.

1. CONTRACTOR shall submit to ENGINEER for acceptance (to the extent indicated in paragraph 2.07) proposed adjustments in the progress schedule that will not result in changing the Contract Times (or Milestones). Such adjustments will conform generally to the progress schedule then in effect and additionally will comply with any provisions of the General Requirements applicable thereto.

2. Proposed adjustments in the progress schedule that will change the Contract Times (or Milestones) shall be submitted in accordance with the requirements of Article 12. Such adjustments may only be made by a Change Order or Written Amendment in accordance with Article 12.

# 6.05 Substitutes and "Or-Equals"

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to ENGINEER for review under the circumstances described below.

1. "Or-Equal" Items: If in ENGINEER's sole discretion an item of material or equipment proposed by CONTRACTOR is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by ENGINEER as an "or-equal" item, in which case review and approval of the proposed item may, in ENGINEER's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:

a. in the exercise of reasonable judgment ENGINEER determines that: (i) it is at least equal in quality, durability, appearance, strength, and design characteristics; (ii) it will reliably perform at least equally well the function imposed by the design concept of the completed Project as a functioning whole, and;

b. CONTRACTOR certifies that: (i) there is no increase in cost to the OWNER; and (ii) it will conform substantially, even with deviations, to the detailed requirements of the item named in the Contract Documents.

# 2. Substitute Items

a. If in ENGINEER's sole discretion an item of material or equipment proposed by CONTRACTOR does not qualify as an "orequal" item under paragraph 6.05.A.1, it will be considered a proposed substitute item. b. CONTRACTOR shall submit sufficient information as provided below to allow ENGINEER to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by ENGINEER from anyone other than CONTRACTOR.

c. The procedure for review by ENGINEER will be as set forth in paragraph 6.05.A.2.d, as supplemented in the General Requirements and as ENGINEER may decide is appropriate under the circumstances.

CONTRACTOR shall first make d. written application to ENGINEER for review of a proposed substitute item of material or equipment that CONTRACTOR seeks to furnish or use. The application shall certify that the proposed substitute item will perform adequately the functions and achieve the results called for by the general design, be similar in substance to that specified, and be suited to the same use as that specified. The application will state the extent, if any, to which the use of the proposed substitute item will prejudice CONTRACTOR's achievement of Substantial Completion on time, whether or not 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 work on the Project) to adapt the design to the proposed substitute item and whether or not incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty. All variations of the proposed substitute item from that specified will be identified in the application, and available engineering, sales, maintenance, repair, and replacement services will be indicated. The application will also contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change, all of which will be considered by ENGINEER in evaluating the proposed substitute item. ENGINEER may require CONTRACTOR

to furnish additional data about the proposed substitute item.

B. Substitute Construction Methods or Procedures: If a specific means, method, technique, sequence, or procedure of construction is shown or indicated in and expressly required by the Contract Documents, CONTRACTOR may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by ENGINEER. CONTRACTOR shall submit sufficient information to allow ENGINEER, in ENGINEER's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The procedure for review by ENGINEER will be similar to that provided in subparagraph 6.05.A.2.

C. Engineer's Evaluation: ENGINEER will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to paragraphs 6.05.A and 6.05.B. ENGINEER will be the sole judge of acceptability. No "or-equal" or substitute will be ordered, installed or utilized until ENGINEER's review is complete, which will be evidenced by either a Change Order for a substitute or an approved Shop Drawing for an "or equal." ENGINEER will advise CONTRACTOR in writing of any negative determination.

D. Special Guarantee: OWNER may require CONTRACTOR to furnish at CONTRACTOR's expense a special performance guarantee or other surety with respect to any substitute.

ENGINEER's Reimbursement: Cost E ENGINEER will record time required by ENGINEER and ENGINEER's Consultants in evaluating substitute proposed or submitted by CONTRACTOR pursuant to paragraphs 6.05.A.2 and 6.05.B and in making changes in the Contract Documents (or in the provisions of any other direct contract with OWNER for work on the Project) occasioned thereby. Whether or not ENGINEER approves a substitute item so proposed or submitted CONTRACTOR CONTRACTOR, shall by reimburse OWNER for the charges of ENGINEER and ENGINEER's Consultants for evaluating each such proposed substitute.

F. *CONTRACTOR's Expense:* CONTRACTOR shall provide all data in support of any proposed substitute or "or-equal" at CONTRACTOR's expense.

6.06 Concerning Subcontractors, Suppliers, and Others

A. CONTRACTOR shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to OWNER as indicated in paragraph 6.06.B), whether initially or as a replacement, against whom OWNER may have reasonable objection. CONTRACTOR shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom CONTRACTOR has reasonable objection.

B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to OWNER in advance for acceptance by OWNER by a specified date prior to the Effective Date of the Agreement, and if CONTRACTOR has submitted a list thereof in accordance with the Supplementary Conditions, OWNER's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. CONTRACTOR shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued or Written Amendment signed. No acceptance by OWNER of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of OWNER or ENGINEER to reject defective Work.

CONTRACTOR shall be fully responsible C. to OWNER and ENGINEER for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as CONTRACTOR is responsible for CONTRACTOR's own acts and omissions. Nothing in the Contract Documents 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 shall it create any obligation on the part of OWNER or ENGINEER to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

D. CONTRACTOR shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with CONTRACTOR.

E. CONTRACTOR shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with ENGINEER through CONTRACTOR.

F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control CONTRACTOR in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

G. All Work performed for CONTRACTOR by a Subcontractor or Supplier will be pursuant to an appropriate agreement between CONTRACTOR and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of OWNER and ENGINEER. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in paragraph 5.06, the agreement between the CONTRACTOR and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all CONTRACTOR, rights against OWNER, ENGINEER, ENGINEER's Consultants, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, CONTRACTOR will obtain the same.

#### 6.07 Patent Fees and Royalties

A. CONTRACTOR shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation

in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if to the actual knowledge of OWNER or ENGINEER its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by OWNER in the Contract Documents. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees or agents, and other consultants of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

#### 6.08 Permits

Unless otherwise provided in the A. Supplementary Conditions, CONTRACTOR shall obtain and pay for all construction permits and OWNER shall assist CONTRACTOR, licenses. when necessary, in obtaining such permits and licenses. CONTRACTOR shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. CONTRACTOR shall pay all charges of utility owners for connections to the Work, and OWNER shall pay all charges of such utility owners for capital costs related thereto, such as plant investment fees.

# 6.09 Laws and Regulations

A. CONTRACTOR shall give all notices and 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.

If CONTRACTOR performs any Work В. knowing or having reason to know that it is contrary to Laws or Regulations, CONTRACTOR shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work; however, it CONTRACTOR's shall not be primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve CONTRACTOR of CONTRACTOR's obligations under paragraph 3.03.

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

# 6.10 Taxes

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

# 6.11 Use of Site and Other Areas

# A. Limitation on Use of Site and Other Areas

1. CONTRACTOR shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. CONTRACTOR shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.

2. Should any claim be made by any such owner or occupant because of the performance of the Work, CONTRACTOR shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.

3. To the fullest extent permitted by Laws Regulations, CONTRACTOR shall and indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultant, and the officers, directors, partners, employees, agents. and other consultants of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against OWNER, ENGINEER, or any other party indemnified hereunder to the extent caused by or based upon CONTRACTOR's performance of the Work.

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

C. *Cleaning:* Prior to Substantial Completion of the Work CONTRACTOR shall clean the Site and make it ready for utilization by OWNER. At the completion of the Work CONTRACTOR shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

D. Loading Structures: CONTRACTOR shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall CONTRACTOR subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

#### 6.12 Record Documents

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

#### 6.13 Safety and Protection

A. CONTRACTOR shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. CONTRACTOR shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

1. all persons on the Site or who may be affected by the Work;

2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and

3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

CONTRACTOR shall comply with all B. applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. CONTRACTOR shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property. All damage, injury, or loss to any property referred to in paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by CONTRACTOR, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by CONTRACTOR (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of OWNER or ENGINEER or ENGINEER's Consultant, 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). CONTRACTOR's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and ENGINEER has issued a notice to OWNER and CONTRACTOR in accordance with paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

# 6.14 Safety Representative

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

#### 6.15 Hazard Communication Programs

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

#### 6.16 Emergencies

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

#### 6.17 Shop Drawings and Samples

A. CONTRACTOR shall submit Shop Drawings to ENGINEER for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample submittals. All submittals will be identified as ENGINEER may require and in the number of copies specified in the General Requirements. The data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show ENGINEER the services, materials, and equipment CONTRACTOR proposes to provide and to enable ENGINEER to review the information for the limited purposes required by paragraph 6.17.E.

B. CONTRACTOR shall also submit Samples to ENGINEER for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample submittals. Each Sample will be identified clearly as to material, Supplier, pertinent data such as catalog numbers, and the use for which intended and otherwise as ENGINEER may require to enable ENGINEER to review the submittal for the limited purposes required by paragraph 6.17.E. The numbers of each Sample to be submitted will be as specified in the Specifications.

C. Where a Shop Drawing or Sample is required by the Contract Documents or the schedule of Shop Drawings and Sample submittals acceptable to ENGINEER as required by paragraph 2.07, 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.

#### D. Submittal Procedures

1. Before submitting each Shop Drawing or Sample, CONTRACTOR shall have determined and verified:

a. all field measurements, quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

b. all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;

c. all information relative to means, methods, techniques, sequences, and procedures of construction and safety precautions and programs incident thereto; and

d. CONTRACTOR shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents. 2. Each submittal shall bear a stamp or specific written indication that CONTRACTOR has satisfied CONTRACTOR's obligations under the Contract Documents with respect to CONTRACTOR's review and approval of that submittal.

3. At the time of each submittal, CONTRACTOR shall give ENGINEER specific written notice of such variations, if any, that the Shop Drawing or Sample submitted may have from the requirements of the Contract Documents, such notice to be in a written communication separate from the submittal; and, in addition, shall cause a specific notation to be made on each Shop Drawing and Sample submitted to ENGINEER for review and approval of each such variation.

# E. ENGINEER's Review

1. ENGINEER will timely review and approve Shop Drawings and Samples in accordance with the schedule of Shop Drawings and Sample submittals acceptable to ENGINEER. ENGINEER's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. ENGINEER's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

3. ENGINEER's review and approval of Shop Drawings or Samples shall not relieve CONTRACTOR from responsibility for any variation from the requirements of the Contract Documents unless CONTRACTOR has in writing called ENGINEER's attention to each such variation at the time of each submittal as required by paragraph 6.17.D.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 approval; nor will any approval by ENGINEER relieve CONTRACTOR from responsibility for complying with the requirements of paragraph 6.17. D.1.

# F. 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.

# 6.18 Continuing the Work

A. CONTRACTOR shall carry on the Work and adhere to the progress schedule during all disputes or disagreements with OWNER. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by paragraph 15.04 or as OWNER and CONTRACTOR may otherwise agree in writing.

# 6.19 CONTRACTOR's General Warranty and Guarantee

A. CONTRACTOR warrants and guarantees to OWNER, ENGINEER, and ENGINEER's Consultants that all Work will be in accordance with the Contract Documents and will not be defective. 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.

B. CONTRACTOR's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of CONTRACTOR's obligation to perform the Work in accordance with the Contract Documents: 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 acceptance by OWNER or any failure to do so;

6. any review and approval of a Shop Drawing or Sample submittal or 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.

#### 6.20 Indemnification

A. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees, agents, and other 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:

1. 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; and

2. is caused in whole or in part 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, regardless of whether or not caused in part by any negligence or omission of an individual or entity indemnified hereunder or whether liability is imposed upon such indemnified party by Laws and Regulations regardless of the negligence of any such individual or entity.

In any and all claims against OWNER or Β. ENGINEER or any of their respective consultants, agents, officers, directors, partners, or employees by any employee (or the survivor or personal representative of such employee) of CONTRACTOR, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for CONTRACTOR or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

C. The indemnification obligations of CONTRACTOR under paragraph 6.20.A shall not extend to the liability of ENGINEER and ENGINEER's Consultants or to the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them 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.

#### **ARTICLE 7 - OTHER WORK**

#### 7.01 Related Work at Site

A. OWNER may perform other work related to the Project at the Site by OWNER's employees, or let other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:

1. written notice thereof will be given to CONTRACTOR prior to starting any such other work; and

2. if OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in paragraph 10.05.

Β. CONTRACTOR shall afford each other contractor who is a party to such a direct contract and each utility owner (and OWNER, if OWNER is performing the other work with OWNER's employees) proper and safe access to the Site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work and shall properly coordinate the Work with theirs. Unless otherwise provided in the Contract Documents, 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 their work and will only cut or alter their work with the written consent of ENGINEER and the others whose work will be affected. The duties and responsibilities of CONTRACTOR under this paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of CONTRACTOR in said direct contracts between OWNER and such utility owners and other contractors.

C. If the proper execution or results of any part of CONTRACTOR's Work depends upon work performed by others under this Article 7, CONTRACTOR shall inspect such other work and promptly report to ENGINEER in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of CONTRACTOR's Work. CONTRACTOR's failure to so report will constitute an acceptance of such other work as fit and proper for integration with CONTRACTOR's Work except for latent defects and deficiencies in such other work.

#### 7.02 Coordination

A. If OWNER intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions 1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;

2. specific matters to be covered by such authority and responsibility will be itemized; and

3. the extent of such authority and responsibilities will be provided.

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

#### ARTICLE 8 - OWNER'S RESPONSIBILITIES

#### 8.01 Communications to Contractor

A. Except as otherwise provided in these General Conditions, OWNER shall issue all communications to CONTRACTOR through ENGINEER.

#### 8.02 Replacement of ENGINEER

A. In case of terminations of the employment of ENGINEER, OWNER shall appoint an engineer to whom CONTRACTOR makes no reasonable objection, whose status under the Contract Documents shall be that of the former ENGINEER.

#### 8.03 Furnish Data

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

#### 8.04 Pay Promptly When Due

A. OWNER shall make payments to CONTRACTOR promptly when they are due as provided in paragraphs 14.02.C and 14.07.C.

#### 8.05 Lands and Easements; Reports and Tests

A. OWNER's duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in paragraphs 4.01 and 4.05. Paragraph 4.02 refers to OWNER's identifying and making available to CONTRACTOR copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site that have been utilized by ENGINEER in preparing the Contract Documents.

# 8.06 Insurance

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

#### 8.07 Change Orders

A. OWNER is obligated to execute Change Orders as indicated in paragraph 10.03.

#### 8.08 Inspections, Tests, and Approvals

A. OWNER's responsibility in respect to certain inspections, tests, and approvals is set forth in paragraph 13.03.B.

#### 8.09 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.

# 8.10 Undisclosed Hazardous Environmental Condition

A. OWNER's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in paragraph 4.06.

#### 8.11 Evidence of Financial Arrangements

A. If and to the extent OWNER has agreed to furnish CONTRACTOR reasonable evidence that financial arrangements have been made to satisfy OWNER's obligations under the Contract Documents, OWNER's responsibility in respect thereto will be set forth in the Supplementary Conditions. ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

### 9.01 OWNER'S Representative

A. ENGINEER will be OWNER's representative during the construction period. The duties and responsibilities and the limitations of authority of ENGINEER as OWNER's representative during construction are set forth in the Contract Documents and will not be changed without written consent of OWNER and ENGINEER.

#### 9.02 Visits to Site

A. ENGINEER will make visits to the Site at intervals appropriate to the various stages of construction as ENGINEER deems necessary in order to observe as an experienced and qualified design professional the progress that has been made of the various aspects and quality 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 the OWNER a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, ENGINEER will keep OWNER informed of the progress of the Work and will endeavor to guard OWNER against defective Work.

B. ENGINEER's visits and observations are subject to all the limitations on ENGINEER's authority and responsibility set forth in paragraph 9. 10, and particularly, but without limitation, during or as a result of ENGINEER's visits or observations of CONTRACTOR's Work ENGINEER will not supervise, direct, control, or have authority over or be responsible for CONTRACTOR's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws and Regulations applicable to the performance of the Work.

### 9.03 Project Representative

If OWNER and ENGINEER agree, A. ENGINEER will furnish a Resident Project Representative to assist ENGINEER in providing more extensive observation of the Work. The responsibilities and authority and limitations thereon of any such Resident Project Representative and assistants will be as provided in paragraph 9. 10 and in the Supplementary Conditions. If OWNER designates another representative or agent to represent OWNER at the Site who is not ENGINEER's Consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

# 9.04 Clarifications and Interpretations

ENGINEER will issue with reasonable A. such written clarifications promptness or interpretations of the requirements of the Contract Documents as ENGINEER may determine necessary, which shall be consistent with the intent of and reasonably inferable from the Contract Documents. Such written clarifications and interpretations will be binding on OWNER and CONTRACTOR. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a written clarification or interpretation, a Claim may be made therefor as provided in paragraph 10.05.

#### 9.05 Authorized Variations in Work

A. ENGINEER may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on OWNER and also on CONTRACTOR, who shall perform the Work involved promptly. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of a Field Order, a Claim may be made therefor as provided in paragraph 10.05.

# 9.06 Rejecting Defective Work

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

# 9.07 Shop Drawings, Change Orders and Payments

A. In connection with ENGINEER's authority as to Shop Drawings and Samples, see paragraph 6.17.

B. In connection with ENGINEER's authority as to Change Orders, see Articles 10, 11, and 12.

C. In connection with ENGINEER's authority as to Applications for Payment, see Article 14.

# 9.08 Determinations for Unit Price Work

ENGINEER will determine the actual Α. 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 data) upon OWNER more accurate and CONTRACTOR, subject to the provisions of paragraph 10.05.

# 9.09 Decisions on Requirements of Contract Documents and Acceptability of Work

A. ENGINEER will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. Claims, disputes and other matters relating to the acceptability of the Work, the quantities and classifications of Unit Price Work, the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, and Claims seeking changes in the Contract Price or Contract Times will be referred initially to ENGINEER in writing, in accordance with the provisions of paragraph 10.05, with a request for a formal decision.

B. When functioning as interpreter and judge under this paragraph 9.09, ENGINEER will not show partiality to OWNER or CONTRACTOR and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity. The rendering of a decision by ENGINEER pursuant to this paragraph 9.09 with respect to any such Claim, dispute, or other matter (except any which have been waived by the making or acceptance of final payment as provided in paragraph 14.07) will be a condition precedent to any exercise by OWNER or CONTRACTOR of such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any such Claim, dispute, or other matter.

# 9.10 Limitations on ENGINEER's Authority and Responsibilities

A. Neither ENGINEER's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by ENGINEER in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by ENGINEER shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by ENGINEER to CONTRACTOR, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. ENGINEER will not supervise, direct, control, or have authority over or be responsible for CONTRACTOR's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws and Regulations applicable to the performance of the Work. ENGINEER will not be responsible for CONTRACTOR's failure to perform the Work in accordance with the Contract Documents.

C. ENGINEER will not be responsible for the acts or omissions of CONTRACTOR or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. ENGINEER's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, Bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.

E. The limitations upon authority and responsibility set forth in this paragraph 9. 10 shall also apply to ENGINEER's Consultants, Resident Project Representative, and assistants.

ARTICLE 10 - CHANGES IN THE WORK; CLAIMS

#### 10.01 Authorized Changes in the Work

A. Without invalidating the Agreement and without notice to any surety, OWNER may, subject to written approval by AGENCY at any time or from time to time, order additions, deletions, or revisions in the Work by a Written Amendment, a Change Order, or a Work Change Directive. Upon receipt of any such document, CONTRACTOR shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

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

#### 10.02 Unauthorized Changes in the Work

A. CONTRACTOR shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in paragraph 3.04, except in the case of an emergency as provided in paragraph 6.16 or in the case of uncovering Work as provided in paragraph 13.04.B.

#### 10.03 Execution of Change Orders

A. OWNER and CONTRACTOR shall execute appropriate Change Orders recommended by ENGINEER (or Written Amendments) covering: 1. changes in the Work which are: (i) ordered by OWNER pursuant to paragraph 10.01.A, (ii) required because of acceptance of defective Work under paragraph 13.08.A or OWNER's correction of defective Work under paragraph 13.09, or (iii) agreed to by the parties;

2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and

changes in the Contract Price or 3 Contract Times which embody the substance of any written decision rendered by ENGINEER pursuant to paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract and applicable Laws Documents and Regulations, but during any such appeal, CONTRACTOR shall carry on the Work and adhere to the progress schedule as provided in paragraph 6.18.A.

#### 10.04 Notification to Surety

A. If notice 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) is required by the provisions of any Bond to be given to a surety, the giving of any such notice will be CONTRACTOR's responsibility. The amount of each applicable Bond will be adjusted to reflect the effect of any such change.

### 10.05 Claims and Disputes

A. Notice: Written notice stating the general nature of each Claim, dispute, or other matter shall be delivered by the claimant to ENGINEER and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. Notice of the amount or extent of the Claim, dispute, or other matter with supporting data shall be delivered to the ENGINEER and the other party to the Contract within 60 days after the start of such event (unless ENGINEER allows additional time for claimant to submit additional or more accurate data in support of such Claim, dispute, or A Claim for an adjustment in other matter). Contract Price shall be prepared in accordance with the provisions of paragraph 12.0l.B. A Claim for an adjustment in Contract Time shall be prepared in accordance with the provisions of paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to ENGINEER and the claimant within 30 days after receipt of the claimant's last submittal (unless ENGINEER allows additional time).

B. *ENGINEER's Decision:* ENGINEER will render a formal decision in writing within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any. ENGINEER's written decision on such Claim, dispute, or other matter will be final and binding upon OWNER and CONTRACTOR unless:

1. an appeal from ENGINEER's decision is taken within the time limits and in accordance with the dispute resolution procedures set forth in Article 16; or

2. if no such dispute resolution procedures have been set forth in Article 16, a written notice of intention to appeal from ENGINEER's written decision is delivered by OWNER or CONTRACTOR to the other and to ENGINEER within 30 days after the date of such decision, and a formal proceeding is instituted by the appealing party in a forum of competent jurisdiction, within 60 days after the date of such decision or within 60 days after Substantial Completion, whichever is later (unless otherwise agreed in writing by OWNER and CONTRACTOR), to exercise such rights or remedies as the appealing party may have with respect to such Claim, dispute, or other matter in accordance with applicable Laws and Regulations.

C. If ENGINEER does not render a formal decision in writing within the time stated in paragraph 10.05.B, a decision denying the Claim in its entirety shall be deemed to have been issued 31 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any.

D. No Claim for an adjustment in Contract Price or Contract Times (or Milestones) will be valid if not submitted in accordance with this paragraph 10.05.

# ARTICLE 11 - COST OF THE WORK; CASH ALLOWANCES; UNIT PRICE WORK

#### 11.01 Cost of the Work.

A. Costs Included: The term Cost of the Work means the sum of all costs necessarily incurred and paid by CONTRACTOR in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to CONTRACTOR will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by OWNER, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items, and shall not include any of the costs itemized in paragraph 11.01.B.

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

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to CONTRACTOR unless OWNER deposits funds with CONTRACTOR with which to make payments, in which case the cash discounts shall accrue to OWNER. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to OWNER, and CONTRACTOR shall make provisions so that they may be obtained.

3. Payments made by CONTRACTOR to Subcontractors for Work performed by If required by OWNER, Subcontractors. CONTRACTOR shall obtain competitive bids from subcontractors acceptable to OWNER and CONTRACTOR and shall deliver such bids to OWNER, who will then determine, with the advice of ENGINEER, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as CONTRACTOR's Cost of the Work and fee as provided in this paragraph 11.01.

4. 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.

Rentals of all construction c. equipment and machinery, and the parts rented from thereof whether CONTRACTOR or others in accordance with rental agreements approved by OWNER with the advice of ENGINEER, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease

when the use thereof is no longer necessary for the Work.

d. Sales, consumer, use, and other similar taxes related to the Work, and for which CONTRACTOR is liable, imposed by Laws and Regulations.

e. Deposits lost for causes other than negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by CONTRACTOR in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with paragraph 5.06.D), provided such losses and damages have resulted from causes than the negligence other of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of OWNER. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining CONTRACTOR's fee.

g. The cost of utilities, fuel, and sanitary facilities at the Site.

h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, expressage, and similar petty cash items in connection with the Work.

i. When the Cost of the Work is used to determine the value of a Change Order or of a Claim, the cost of premiums for additional Bonds and insurance required because of the changes in the Work or caused by the event giving rise to the Claim.

j. When all the Work is performed on the basis of cost-plus, the costs of

premiums for all Bonds and insurance CONTRACTOR is required by the Contract Documents to purchase and maintain.

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

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

2. Expenses of CONTRACTOR's principal and branch offices other than CONTRACTOR's office at the Site.

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

4. Costs due to the negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in paragraphs 11.01.A and 11.01.B.

C. CONTRACTOR's Fee: When all the Work is performed on the basis of cost-plus, CONTRACTOR's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, CONTRACTOR's fee shall be determined as set forth in paragraph 12.01.C.

D. *Documentation*: Whenever the Cost of the Work for any purpose is to be determined pursuant to paragraphs 11.01.A and 11.01.B, CONTRACTOR will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to ENGINEER an itemized cost breakdown together with supporting data.

# 11.02 Cash 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 as may be acceptable to OWNER and ENGINEER. CONTRACTOR agrees that:

1. the 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 costs, overhead, profit, and other expenses contemplated for the 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.

B. Prior to final payment, an appropriate Change Order will be issued as recommended by ENGINEER to reflect actual amounts due CONTRACTOR on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

#### 11.03 Unit Price Work

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by CONTRACTOR will be made by ENGINEER subject to the provisions of paragraph 9.08.

B. Each unit price will be deemed to include an amount considered by CONTRACTOR to be adequate to cover CONTRACTOR's overhead and profit for each separately identified item.

C. OWNER or CONTRACTOR may make a Claim for an adjustment in the Contract Price in accordance with paragraph 10.05 if:

1. the quantity of any item of Unit Price Work performed by CONTRACTOR differs by more than 25 percent from the estimated quantity of such item indicated in the Agreement; and

2. CONTRACTOR believes that CONTRACTOR is entitled to an increase in Contract Price as a result of having incurred additional expense or OWNER believes that OWNER is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

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

# 12.01 Change of Contract Price

A. The Contract Price may only be changed by a Change Order or by a Written Amendment. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the claim to the ENGINEER and the other party to the Contract in accordance with the provisions of paragraph 10.05.

B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:

1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of paragraph 11.03); or 2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with paragraph 12.01.C.2); or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under paragraph 12.0l.B.2, on the basis of the Cost of the Work (determined as provided in paragraph 11.01) plus a CONTRACTOR's fee for overhead and profit (determined as provided in paragraph 12.0l.C).

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

1. a mutually acceptable fixed fee; or

2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

a. for costs incurred under paragraphs 11.01.A.1 and 11.01.A.2, the CONTRACTOR's fee shall be 15 percent;

b. for costs incurred under paragraph 11.01.A.3, the CONTRACTOR's fee shall be five percent;

c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of paragraph 12.01.C.2.a is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and CONTRACTOR will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;

d. no fee shall be payable on the basis of costs itemized under paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;

e. the amount of credit to be allowed by CONTRACTOR to OWNER for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in CONTRACTOR's fee by an amount equal to five percent of such net decrease; and

f. when both additions and credits are involved in any one change, the adjustment in CONTRACTOR's fee shall be computed on the basis of the net change in accordance with paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

#### 12.02 Change of Contract Times

A. The Contract Times (or Milestones) may only be changed by a Change Order or by a Written Amendment. Any Claim for an adjustment in the Contract Times (or Milestones) shall be based on written notice submitted by the party making the claim to the ENGINEER and the other party to the Contract in accordance with the provisions of paragraph 10.05.

B. Any adjustment of the Contract Times (or Milestones) covered by a Change Order or of any Claim for an adjustment in the Contract Times (or Milestones) will be determined in accordance with the provisions of this Article 12.

#### 12.03 Delays Beyond CONTRACTOR's Control

A. Where CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of CONTRACTOR, the Contract Times (or Milestones) will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in paragraph 12.02.A. Delays beyond the control of CONTRACTOR shall include, but not be limited to, acts or neglect by OWNER, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

### 12.04 Delays Within CONTRACTOR's Control

A. The Contract Times (or Milestones) will not be extended due to delays within the control of CONTRACTOR. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of CONTRACTOR.

# 12.05 Delays Beyond OWNER's and CONTRACTOR's Control

A. Where CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of both OWNER and CONTRACTOR, an extension of the Contract Times (or Milestones) in an amount equal to the time lost due to such delay shall be CONTRACTOR's sole and exclusive remedy for such delay.

#### 12.06 Delay Damages

A. In no event shall OWNER or ENGINEER be liable to CONTRACTOR, any Subcontractor, any Supplier, or any other person or organization, or to any surety for or employee or agent of any of them, for damages arising out of or resulting from:

1. delays caused by or within the control of CONTRACTOR; or

2. delays beyond the control of both OWNER and CONTRACTOR including but not limited to fires, floods, epidemics, abnormal weather conditions, acts of God, or acts or neglect by utility owners or other contractors performing other work as contemplated by Article 7.

B. Nothing in this paragraph 12.06 bars a change in Contract Price pursuant to this Article 12 to compensate CONTRACTOR due to delay, interference, or disruption directly attributable to actions or inactions of OWNER or anyone for whom OWNER is responsible.

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

13.01 Notice of Defects

A. Prompt notice of all defective Work of which OWNER or ENGINEER has actual knowledge will be given to CONTRACTOR. All defective Work may be rejected, corrected, or accepted as provided in this Article 13.

### 13.02 Access to Work

A. OWNER, ENGINEER, ENGINEER's Consultants, other representatives and personnel of OWNER, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspecting, and testing. CONTRACTOR shall provide them proper and safe conditions for such access and advise them of CONTRACTOR's Site safety procedures and programs so that they may comply therewith as applicable.

#### 13.03 Tests and Inspections

A. CONTRACTOR shall give ENGINEER timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

B. OWNER shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:

1. for inspections, tests, or approvals covered by paragraphs 13.03.C and 13.03.D below;

2. that costs incurred in connection with tests or inspections conducted pursuant to paragraph 13.04.B shall be paid as provided in said paragraph 13.04.B; and

3. as otherwise specifically provided in the Contract Documents.

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

D. CONTRACTOR shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for OWNER's and ENGINEER's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to CONTRACTOR's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to OWNER and ENGINEER.

E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by CONTRACTOR without written concurrence of ENGINEER, it must, if requested by ENGINEER, be uncovered for observation.

F. Uncovering Work as provided in paragraph 13.03.E shall be at CONTRACTOR's expense unless CONTRACTOR has given ENGINEER timely notice of CONTRACTOR's intention to cover the same and ENGINEER has not acted with reasonable promptness in response to such notice.

#### 13.04 Uncovering Work

A. If any Work is covered contrary to the written request of ENGINEER, it must, if requested by ENGINEER, be uncovered for ENGINEER's observation and replaced at CONTRACTOR's expense.

B. If ENGINEER considers it necessary or advisable that covered Work be observed by ENGINEER or inspected or tested by others, CONTRACTOR, at ENGINEER's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as ENGINEER may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment. If it is found that such Work is defective, CONTRACTOR shall pay all Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and OWNER shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, OWNER may make a Claim therefor as provided in paragraph 10.05. If, however, such 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 Milestones), or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, CONTRACTOR may make a Claim therefor as provided in paragraph 10.05.

# 13.05 OWNER May Stop the Work

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

# 13.06 Correction or Removal of Defective Work

A. CONTRACTOR shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by ENGINEER, remove it from the Project and replace it with Work that is not defective. CONTRACTOR shall pay all Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

# 13.07 Correction Period

If within one year after the date of · A. Substantial Completion or such longer period of time as may be prescribed by Laws or Regulations or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for CONTRACTOR's use by OWNER or permitted by Laws and Regulations as contemplated in paragraph 6.11.A is found to be defective, CONTRACTOR shall promptly, without cost to OWNER and in accordance with OWNER's written instructions: (i) repair such defective land or areas, or (ii) correct such defective Work or, if the defective Work has been rejected by OWNER, remove it from the Project and replace it with Work that is not defective, and (iii) satisfactorily correct or repair or

remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom. If CONTRACTOR does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, OWNER may have the defective Work corrected or repaired or may have the rejected Work removed and replaced, and all Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by CONTRACTOR.

B. 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 or by Written Amendment.

C. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

D. CONTRACTOR's obligations under this paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this paragraph 13.07 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitation or repose.

#### 13.08 Acceptance of Defective Work

A. If, instead of requiring correction or removal and replacement of defective Work, OWNER (and, prior to ENGINEER's recommendation of final payment, ENGINEER) prefers to accept it, OWNER may do so. CONTRACTOR shall pay all Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to OWNER's evaluation of and determination to accept such defective Work (such costs to be approved by ENGINEER as to reasonableness) and the diminished value of the Work to the extent not otherwise paid by CONTRACTOR pursuant to this sentence. If any such acceptance occurs prior to ENGINEER's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and OWNER shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, OWNER may make a Claim therefor as provided in paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by CONTRACTOR to OWNER.

#### 13.09 OWNER May Correct Defective Work

A. If CONTRACTOR fails within a reasonable time after written notice from ENGINEER to correct defective Work or to remove and replace rejected Work as required by ENGINEER in accordance with paragraph 13.06.A, or if CONTRACTOR fails to perform the Work in accordance with the Contract Documents, or if CONTRACTOR fails to comply with any other provision of the Contract Documents, OWNER may, after seven days written notice to CONTRACTOR, correct and remedy any such deficiency.

B. In exercising the rights and remedies under paragraph, OWNER shall proceed this expeditiously. In connection with such corrective and remedial action, OWNER may exclude CONTRACTOR from all or part of the Site, take possession of all or part of the Work and suspend CONTRACTOR's services related thereto, take possession of CONTRACTOR's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which OWNER has paid CONTRACTOR but which are stored elsewhere. CONTRACTOR shall allow OWNER, OWNER's representatives, agents and employees, OWNER's other contractors, and ENGINEER and ENGINEER's Consultants access to the Site to enable OWNER to exercise the rights and remedies under this paragraph.

C. All Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by OWNER in exercising the rights and remedies under this paragraph 13.09 will be charged against CONTRACTOR, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and OWNER shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, OWNER may make a Claim therefor as provided in paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of CONTRACTOR's defective Work.

D. CONTRACTOR shall not be allowed an extension of the Contract Times (or Milestones) because of any delay in the performance of the Work attributable to the exercise by OWNER of OWNER's rights and remedies under this paragraph 13.09

# ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION

#### 14.01 Schedule of Values

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

#### 14.02 Progress Payments

#### A. Applications for Payments

1. At least 20 days before the date established for each progress payment (but not often than once а month). more 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 and other arrangements to protect OWNER's interest therein, all of which must be satisfactory to OWNER.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of CONTRACTOR stating that all previous progress payments received on account of the Work have been applied on account to discharge CONTRACTOR's legitimate obligations associated with prior Applications for Payment.

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

#### B. Review of Application

1. ENGINEER will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to OWNER or return the Application to CONTRACTOR indicating in writing ENGINEER's reasons for refusing to recommend payment. In the latter case, CONTRACTOR may make the necessary corrections and resubmit the Application.

2. ENGINEER's recommendation of any payment requested in an Application for Payment will constitute a representation by ENGINEER to OWNER, based on ENGINEER's observations on the Site 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, to the results of any subsequent tests called for in the Contract Documents. final to a determination of quantities and classifications for Unit Price Work under paragraph 9.08, and to 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: (i) inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to ENGINEER in the Contract Documents; or (ii) that 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 to supervise, direct, or control the Work or for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions programs incident thereto. or for and CONTRACTOR's failure to comply with Laws and applicable to CONTRACTOR's Regulations performance of the Work. Additionally, said review or recommendation will not impose responsibility on ENGINEER to make any examination to ascertain how or for what purposes CONTRACTOR has used the moneys paid on account of the Contract Price, or 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 referred to in paragraph 14.02.B.2. ENGINEER may also refuse to recommend any such payment or, because of subsequently discovered evidenceor the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in ENGINEER's opinion to protect OWNER from loss because:

a. the Work is defective, or completed Work has been damaged, requiring correction or replacement; b. the Contract Price has been reduced by Written Amendment or Change Orders;

c. OWNER has been required to correct defective Work or complete Work in accordance with paragraph 13.09; or

d. ENGINEER has actual knowledge of the occurrence of any of the events enumerated in paragraph 15.02.A.

# C. Payment Becomes Due

1. Ten days after presentation of the Application for Payment to OWNER with ENGINEER's recommendation and Funding Agency approval (if applicable), the amount recommended will (subject to the provisions of paragraph 14.02.D) become due, and when due will be paid by OWNER to CONTRACTOR.

#### D. Reduction in Payment

1. OWNER may refuse to make payment of the full amount recommended by ENGINEER because:

a. claims have been made against OWNER on account of CONTRACTOR's performance or furnishing of the Work;

b. liens have been filed in connection with the Work, except where CONTRACTOR has delivered a specific Bond satisfactory to OWNER to secure the satisfaction and discharge of such Liens;

c. there are other items entitling OWNER to a set-off against the amount recommended; or

d. OWNER has actual knowledge of the occurrence of any of the events enumerated in paragraphs 14.02.B.5.a through 14.02.B.5.c or paragraph 15.02.A.

2. If OWNER refuses to make payment of the full amount recommended by ENGINEER, OWNER must give CONTRACTOR immediate written notice (with a copy to ENGINEER) stating the reasons for such action and promptly pay CONTRACTOR any amount remaining after deduction of the amount so withheld. OWNER shall promptly pay CONTRACTOR the amount so withheld, or any adjustment thereto agreed to by OWNER and CONTRACTOR, when CONTRACTOR corrects to OWNER's satisfaction the reasons for such action.

3. If it is subsequently determined that OWNER's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by paragraph 14.02.C.1.

# 14.03 CONTRACTOR's Warranty of Title

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

#### 14.04 Substantial Completion

A. When CONTRACTOR considers the entire Work ready for its intended use CONTRACTOR shall notify OWNER and ENGINEER in writing that the entire Work is substantially complete (except for items specifically listed by CONTRACTOR as incomplete) and request that ENGINEER issue a certificate of Substantial Completion. Promptly thereafter, OWNER, AGENCY, CONTRACTOR, and ENGINEER shall make a prefinal 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. If ENGINEER considers the Work substantially complete, ENGINEER will prepare and deliver to OWNER a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. OWNER shall have seven days after receipt of the tentative certificate during which to make written objection to ENGINEER as to any provisions of the certificate or attached list. If, after considering such objections, ENGINEER concludes that the Work is not substantially complete, ENGINEER will within 14 days after submission of the tentative certificate to OWNER notify CONTRACTOR in writing, stating the reasons If, after consideration of OWNER's therefor. objections, ENGINEER considers the Work substantially complete, ENGINEER will within said 14 days execute and deliver to OWNER and

CONTRACTOR a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as ENGINEER believes justified after consideration of any objections from OWNER. At the time of delivery of the tentative certificate of Substantial Completion ENGINEER will deliver to OWNER and CONTRACTOR a written recommendation as to division of responsibilities pending final payment between OWNER and CONTRACTOR with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless OWNER and CONTRACTOR agree otherwise in writing and so inform ENGINEER in writing prior to ENGINEER's issuing the definitive certificate of Substantial Completion, ENGINEER's aforesaid recommendation will be binding on OWNER and CONTRACTOR until final payment.

B. OWNER shall have the right to exclude CONTRACTOR from the Site after the date of Substantial Completion, but OWNER shall allow CONTRACTOR reasonable access to complete or correct items on the tentative list.

# 14.05 Partial Utilization

A. Use by OWNER at OWNER's option of 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, may be accomplished prior to Substantial Completion of all the Work subject to the following conditions.

OWNER at any time may request 1. CONTRACTOR in writing to permit OWNER to use any such part of the Work which OWNER believes to be ready for its intended and substantially complete. use If CONTRACTOR agrees that such part of the Work is substantially complete. CONTRACTOR will certify to OWNER and ENGINEER that such part of the Work is substantially complete and request ENGINEER to issue a certificate of Substantial Completion for that part of the Work. CONTRACTOR at any time may notify OWNER and ENGINEER in writing that CONTRACTOR considers any such part of the Work ready for its intended use

and substantially complete and request ENGINEER to issue a certificate of Substantial Completion for that part of the Work. Within a reasonable time after either such request, OWNER, CONTRACTOR, and ENGINEER shall make an inspection of that part of the Work to determine its status of completion. If ENGINEER does not consider that part of the Work to be substantially complete, ENGINEER will notify OWNER and CONTRACTOR in writing giving the reasons therefor. If ENGINEER considers that part of the Work to be substantially complete, the provisions of paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

2. No occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of paragraph 5.10 regarding property insurance.

# 14.06 Final Inspection

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

# 14.07 Final Payment

# A. Application for Payment

After CONTRACTOR has, in the 1. satisfactorily opinion of ENGINEER, completed all corrections identified during the final inspection and has delivered. in accordance with the Contract Documents, all maintenance and operating instructions. schedules, guarantees, Bonds, certificates or other evidence of insurance certificates of inspection, marked-up record documents (as provided in paragraph 6.12), and other documents, CONTRACTOR may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by: (i) all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by subparagraph 5.04.B.7; (ii) consent of the surety, if any, to final payment; and (iii) complete and legally effective releases or waivers (satisfactory to OWNER) of all Lien rights arising out of or Liens filed in connection with the Work.

In lieu of the releases or waivers 3. of Liens specified in paragraph 14.07.A.2 and as approved by OWNER, CONTRACTOR may furnish receipts or releases in full and an affidavit of CONTRACTOR that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which OWNER or OWNER's property might in any way be responsible have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, CONTRACTOR may furnish a Bond or other collateral satisfactory to OWNER to indemnify OWNER against any Lien.

#### B. Review of Application and Acceptance

If, on the basis of ENGINEER's 1. observation of the Work during construction and final inspection, and ENGINEER's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, ENGINEER is satisfied that the Work has been completed and CONTRACTOR's other obligations under the Contract Documents have been fulfilled, ENGINEER will within ten days after receipt of the final Application for Payment, indicate in writing ENGINEER's recommendation of payment and present the Application for Payment to At the same time OWNER for payment. ENGINEER will also give written notice to OWNER and CONTRACTOR that the Work is acceptable subject to the provisions of paragraph 14.09. Otherwise, ENGINEER will return the Application for Payment to CONTRACTOR, indicating in writing the reasons for refusing to recommend final payment, in which case shall make the necessary CONTRACTOR corrections and resubmit the Application for Payment.

# C. Payment Becomes Due

1. Thirty days after the presentation to OWNER of Application for Payment and accompanying documentation, the amount recommended by ENGINEER will become due and, when due, will be paid by OWNER to CONTRACTOR.

# 14.08 Final Completion Delayed

A. If, through no fault of CONTRACTOR, final completion of the Work is significantly delayed, and if ENGINEER so confirms, OWNER shall, upon receipt of final Application for Payment and recommendation of ENGINEER, and without terminating the Agreement, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by OWNER for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if Bonds have been furnished as required in paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by CONTRACTOR to ENGINEER with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims. The remaining balance of any sum included in the final Application for Payment but held by OWNER for Work not fully completed and accepted will become due when the Work is fully completed and accepted.

#### 14.09 Waiver of Claims

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by OWNER against CONTRACTOR, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from CONTRACTOR's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by CONTRACTOR against OWNER other than those previously made in writing which are still unsettled.

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

# 15.01 OWNER May Suspend Work

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

# 15.02 OWNER May Terminate for Cause

A. The occurrence of any one or more of the following events will justify termination for cause:

1. CONTRACTOR's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the progress schedule established under paragraph 2.07 as adjusted from time to time pursuant to 6.04);

2. CONTRACTOR's disregard of Laws or Regulations of any public body having jurisdiction;

3. CONTRACTOR's disregard of the authority of ENGINEER; or

4. CONTRACTOR's violation in any substantial way of any provisions of the Contract Documents.

B. If one or more of the events identified in paragraph 15.02.A occur, OWNER may, after giving CONTRACTOR (and the surety, if any) seven days written notice, terminate the services of CONTRACTOR, exclude CONTRACTOR from the Site, and take possession of the Work and of all CONTRACTOR's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by liability CONTRACTOR (without to CONTRACTOR for trespass or conversion), 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 finish the Work as OWNER may deem expedient. In such case, CONTRACTOR shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by OWNER arising out of or relating to completing the Work, such excess will be paid to CONTRACTOR. If such claims, costs, losses, and damages exceed such unpaid balance, CONTRACTOR shall pay the difference to OWNER. Such claims, costs, losses, and damages incurred by OWNER will be reviewed by ENGINEER as to their reasonableness and, when so approved by ENGINEER, incorporated in a Change Order. When exercising any rights or remedies under this paragraph OWNER shall not be required to obtain the lowest price for the Work performed.

C. Where CONTRACTOR's services have been so terminated by OWNER, the termination will not affect any rights or remedies of OWNER against CONTRACTOR then existing or which may thereafter accrue. Any retention or payment of moneys due CONTRACTOR by OWNER will not release CONTRACTOR from liability.

#### 15.03 OWNER May Terminate For Convenience

A. Upon seven days written notice to CONTRACTOR and ENGINEER, OWNER may, without cause and without prejudice to any other right or remedy of OWNER, elect to terminate the Contract. In such case, CONTRACTOR shall be paid (without duplication of any items):

1. for completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. for expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;

3. for all claims, costs, losses, and damages (including but not limited to all fees and

charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

4. for reasonable expenses directly attributable to termination.

B. CONTRACTOR shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

# 15.04 CONTRACTOR May Stop Work or Terminate

If, through no act or fault of A. CONTRACTOR, the Work is suspended for more than 90 consecutive days by OWNER or under an order of court or other public authority, or ENGINEER fails to act on any Application for Payment within 30 days after it is submitted, or OWNER fails for 30 days to pay CONTRACTOR any sum finally determined to be due, then CONTRACTOR may, upon seven days written notice to OWNER and ENGINEER, and provided OWNER or ENGINEER do not remedy such suspension or failure within that time, terminate the Contract and recover from OWNER payment on the same terms as provided in paragraph 15.03. In lieu of terminating the Contract and without prejudice to any other right or remedy, if ENGINEER has failed to act on an Application for Payment within 30 days after it is submitted, or OWNER has failed for 30 days to pay CONTRACTOR any sum finally determined to be due, CONTRACTOR may, seven days after written notice to OWNER and ENGINEER, stop the Work until payment is made of all such amounts due CONTRACTOR, including interest thereon. The provisions of this paragraph 15.04 are not intended to preclude CONTRACTOR from making a Claim under paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to CONTRACTOR's stopping the Work as permitted by this paragraph.

#### **ARTICLE 16 - DISPUTE RESOLUTION**

#### 16.01 Methods and Procedures

A. Dispute resolution methods and procedures, if any, shall be as set forth in the Supplementary Conditions. If no method and procedure has been set forth, and subject to the provisions of paragraphs 9.09 and 10.05, OWNER and CONTRACTOR may exercise such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any dispute.

#### ARTICLE 17 – MISCELLANEOUS

#### 17.01 Giving Notice

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or if delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

#### 17.02 Computation of Times

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

#### 17.03 Cumulative Remedies

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents, and the provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

#### 17.04 Survival of Obligations

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

# 17.05 Controlling Law

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

# ARTICLE 18 - FEDERAL REQUIREMENTS

#### 18.01 AGENCY Not a Party

A. This Contract may be funded in part with funds provided by AGENCY. Neither AGENCY, nor any of its departments, entities, or employees is a party to this Contract.

#### 18.02 Contract Approval

A. OWNER and CONTRACTOR will furnish OWNER'S attorney such evidence as required so that OWNER'S attorney can complete and execute the following "Certificate of Owner's Attorney" (Exhibit GC-A) before OWNER submits the executed Contract Documents to AGENCY, if applicable, for approval.

B. Concurrence by AGENCY in the award of the Contract, if applicable, is required before the Contract is effective.

#### 18.03 Conflict of Interest

A. CONTRACTOR may not knowingly contract with a supplier or manufacturer if the individual or entity who prepared the plans and specifications has a corporate or financial affiliation with the supplier or manufacturer.

B. OWNER's officers, employees, or agents shall not engage in the award or administration of this Contract if a conflict of interest, real or apparent, would be involved. Such a conflict would arise when: (i) the employee, officer or agent; (ii) any member of their immediate family; (iii) their partner or (iv) an organization that employs, or is about to employ, any of the above, has a financial interest in CONTRACTOR. OWNER's officers, employees, or agents shall neither solicit nor accept gratuities, favors or anything of monetary value from CONTRACTOR or subcontractors.

#### 18.04. Gratuities

A. If OWNER finds after a notice and hearing that CONTRACTOR, or any of CONTRACTOR's agents or representatives, offered or gave gratuities (in the form of entertainment, gifts, or otherwise) to any official, employee, or agent of OWNER or AGENCY in an attempt to secure this Contract or favorable treatment in awarding, amending, or making any determinations related to the performance of this Contract, OWNER may, by written notice to CONTRACTOR, terminate this Contract. OWNER may also pursue other rights and remedies that the law or this Contract provides. However, the existence of the facts on which OWNER bases such findings shall be an issue and may be reviewed in proceedings under the dispute resolution provisions of this Contract

B. In the event this Contract is terminated as provided in paragraph 18.04.A, OWNER may pursue the same remedies against CONTRACTOR as it could pursue in the event of a breach of this Contract by CONTRACTOR. As a penalty, in addition to any other damages to which it may be entitled by law, OWNER may pursue exemplary damages in an amount (as determined by OWNER) which shall not be less than three nor more than ten times the costs CONTRACTOR incurs in providing any such gratuities to any such officer or employee.

#### 18.05 Audit and Access to Records

A. For all negotiated contracts and negotiated modifications (except those of \$10,000 or less), OWNER, AGENCY, the Comptroller General, or any of their duly authorized representatives, shall have access to any books, documents, papers, and records of the CONTRACTOR, which are pertinent to the Contract, for the purpose of making audits, examinations, excerpts and transcriptions. CONTRACTOR shall maintain all required records for three years after final payment is made and all other pending matters are closed.

#### 18.06 Small, Minority and Women's Businesses

A. If CONTRACTOR intends to let any subcontracts for a portion of the work, CONTRACTOR shall take affirmative steps to

assure that small, minority and women's businesses are used when possible as sources of supplies, equipment, construction, and services. Affirmative steps shall consist of: (1) including qualified small, minority and women's businesses on solicitation lists; (2) assuring that small, minority and women's businesses are solicited whenever they are potential sources; (3) dividing total requirements when economically feasible, into small tasks or quantities to permit maximum participation of small, minority, and women's businesses; (4) establishing delivery schedules, where the requirements of the work permit, which will encourage participation by small, minority and women's businesses; (5) using the services and assistance of the Small Business Administration and the Minority Business Development Agency of the U.S. Department of Commerce; (6) requiring each party to a subcontract to take the affirmative steps of this section; and (7) CONTRACTOR is encouraged to procure goods and services from labor surplus area firms.

#### 18.07 Anti-Kickback

A. CONTRACTOR shall comply with the Copeland Anti-Kickback Act (18 USC 874) as supplemented in Department of Labor regulations (29 CFR Part 3). This act provides that CONTRACTOR shall be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public facilities, to give up any part of the compensation to which they are otherwise entitled. OWNER shall report all suspected or reported violations to AGENCY.

#### 18.08 Violating Facilities

A. Where this Contract exceeds \$100,000 CONTRACTOR shall comply with all applicable standards, orders or requirements issued under section 306 of the Clean Air Act (42 USC 1857(h)), section 508 of the Clean Water Act (33 USC 1368), Executive Order 11738, and Environmental Protection Agency regulations (40 CFR Part 15) which prohibit the awarding of non-exempt federal contracts, grants, or loans to facilities included on EPA's list of violating facilities. CONTRACTOR will report violations to the EPA.

#### 18.09 State Energy Policy

A. CONTRACTOR shall comply with the Energy Policy and Conservation Act (P.L. 94-163). Mandatory standards and policies relating to energy

efficiency, contained in any applicable State Energy Conservation Plan, shall be utilized.

# 18.10 Equal Opportunity Requirements

A. If this Contract exceeds \$10,000, CONTRACTOR shall comply with Executive Order 11246, entitled "Equal Employment Opportunity," as amended by Executive Order 11375, and as supplemented in Department of Labor regulations (41 CFR Part 60).

B. CONTRACTOR's compliance with Executive Order 11246 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative active obligations required by Federal Standard Equal Employment the Opportunity Construction Contract Specifications, as set forth in 41 CFR Part 60-4 and its efforts to meet the goals established for the geographical area where the Contract is to be performed. The hours of minority and female employment and training must be substantially uniform throughout the length of the Contract, and in each trade, and CONTRACTOR shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from CONTRACTOR to CONTRACTOR or from project to project for the sole purpose of meeting CONTRACTOR's goals shall be a violation of the Contract, the Executive Order, and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

C. CONTRACTOR shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in excess of \$10,000 at any tier for construction work under the Contract resulting from this solicitation. The notification shall list the name, address, and telephone number of the subcontractor; employer identification number; estimated dollar amount of subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the Contract is to be performed.

#### 18.11 Restrictions on Lobbying

A. CONTRACTOR and each subcontractor shall comply with Restrictions on Lobbying (Public Law 101121, Section 319) as supplemented by applicable AGENCY regulations. This Law applies to the recipients of contracts and subcontracts that exceed \$100,000 at any tier under a Federal loan that exceeds \$150,000 or a Federal grant that exceeds \$100,000. If applicable, CONTRACTOR must complete a certification form on lobbying activities related to a specific Federal loan or grant that is a funding source for this Contract. Necessary certification and disclosure forms shall be provided by OWNER.

#### 18.12 Environmental Requirements

A. When constructing a project involving trenching and/or other related earth excavations, CONTRACTOR shall comply with the following environmental constraints:

1. Wetlands -- When disposing of excess, spoil, or other construction materials on public or private property, CONTRACTOR shall not fill in or otherwise convert wetlands.

2. Floodplains -- When disposing of excess, spoil, or other construction materials on public or private property, CONTRACTOR shall not fill in or otherwise convert 100 year floodplain areas delineated on the latest Federal Emergency Management Agency Floodplain Maps.

3. Historic Preservation -- Any excavation by CONTRACTOR that uncovers an historical or archaeological artifact shall be immediately reported to OWNER and a representative of AGENCY. Construction shall be temporarily halted pending the notification process and further directions issued by AGENCY after consultation with the State Historic Preservation Officer (SHPO).

4. Endangered Species -- CONTRACTOR shall comply with the Endangered Species Act, which provides for the protection of endangered and/or threatened species and critical habitat. Should any evidence of the presence of endangered and/or threatened species or their critical habitat be brought to the attention of CONTRACTOR, CONTRACTOR will immediately report this evidence to OWNER and a representative of AGENCY. Construction shall be temporarily halted pending the notification process and further directions issued by AGENCY after consultation with the U.S. Fish and Wildlife Service.

# **Supplementary Conditions**

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract Funding Agency Edition (No. 1910-8-FA, 1997 Edition) and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

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

SC-1.01.A.4. Add the following language to the end of paragraph 1.01.A.4:

The Application for Payment form to be used on this Project is RD 1924-18.

SC-1.01.A.10. Add the following language to the end of paragraph 1.01.A.10:

The Change Order form to be used on this Project is RD 1924-7.

SC-1.01.A.21. Add the following language to the end of paragraph 1.01.A.21:

The ENGINEER's Consultants on this project, if any, will be duly qualified and registered to perform their discipline in North Carolina.

SC-2.03.A. Delete paragraph 2.03.A in its entirety and insert the following in its place:

A. The Contract Times will commence to run on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 60 days after the Effective Date of the Agreement.

SC-4.02. Add the following new paragraphs immediately after paragraph 4.02.B:

C. In the preparation of Drawings and Specifications, ENGINEER or ENGINEER's Consultants relied upon reports, if any, of exploration and tests of subsurface conditions at the Site. D. In the preparation of Drawings and Specifications, ENGINEER or ENGINEER's Consultants relied upon drawings, if any, of physical conditions in or relating to existing surface and subsurface structures (except Underground Facilitates) which are at or contiguous to the Site.

E. Copies of reports and drawings referred to in SC-4.02.C and SC-4.02.D that are not included with Bidding Documents may be examined at the office of Green Engineering, P.L.L.C.; 303 North Goldsboro Street; Wilson, North Carolina 27893 during regular business hours. These reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which the CONTRACTOR may rely as identified and established above are incorporated therein by reference. CONTRACTOR is not entitled to rely upon other information and data utilized by ENGINEER and ENGINEER's Consultants in the preparation of the Drawings and Specifications.

SC-4.06. Add the following new paragraphs immediately after paragraph 4.06.A:

1. In the preparation of Drawings and Specifications, ENGINEER or ENGINEER's Consultants relied upon reports, if any, of Hazardous Environmental Conditions at the Site.

2. In the preparation of Drawings and Specifications, ENGINEER or ENGINEER's Consultants relied upon drawings, if any, of Hazardous Environmental Conditions which are at or contiguous to the Site.

3. Copies of reports and drawings referred to in SC-4.06.A.1 and SC-4.06.A.2 that are not included with Bidding Documents may be examined at the office of Green Engineering, P.L.L.C.; 303 North Goldsboro Street; Wilson, North Carolina 27893 during regular business hours. These reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which the CONTRACTOR may rely as identified and established above are incorporated therein by reference. CONTRACTOR is not entitled to rely upon other information and data utilized by ENGINEER and ENGINEER's Consultants in the preparation of the Drawings and Specifications.

SC-5.04. Add the following new paragraph immediately after paragraph 5.04.B:

C. The limits of liability for insurance required by paragraph 5.04 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 5.04.A.1 and A.2 of the General Conditions:

| a. State:               | Statutory |
|-------------------------|-----------|
| b. Applicable Federal   |           |
| (e.g., Longshoremen's)  | Statutory |
| c. Employer's Liability | Statutory |

2. Contractor's General Liability under paragraphs 5.04.A.3 and A.6 of the General Conditions which shall include completed operations and product liability coverages and eliminate the exclusion with respect to property under the care, custody, and control of the Contractor:

| a. | General Aggregate | \$ 2,000,000 |
|----|-------------------|--------------|
|----|-------------------|--------------|

- b. Products Completed Operations Aggregate \$1,000,000
- c. Personal and Advertising Injury \$ 1,000,000
- d. Each Occurrence (Bodily Injury and Property Damage) \$ 1,000,000
- e. Property Damage liability insurance will provide Explosion, Collapse, and Underground coverages where applicable.
- f. Excess or Umbrella Liability 1) General Aggregate \$ 5,000,000 2) Each Occurrence \$ 5,000,000

3. Automobile Liability under paragraph 5.40.A.6 of the General Conditions:

| a. Combined Single |              |
|--------------------|--------------|
| Limit of           | \$ 1,000,000 |

4. The Contractual Liability coverage required by paragraph 5.04.B.4 of the General Conditions shall be provided by the CONTRACTOR as part of the CONTRACTOR'S General Liability coverage. 5. The Contractor shall provide General Liability coverage in an amount to satisfy the requirements stipulated in any easement and/or encroachment agreement obtained for the construction of the project.

SC-5.06.A. In the case of multiple prime contractors on a single Site, each prime contractor for the Project will need to provide property insurance as required in paragraph 5.06.A of the General Conditions.

SC-5.06.A.2 Amend paragraph to read: be written on a Builder's Risk, "all risk" or open peril or special causes of loss policy form in the amount of bid for above ground structures and on an Installation Floater form in the amount of the total bid less any amount included on the Builder's Risk, etc. form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, false work, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss; fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, and such other perils or causes of loss as may be specifically required by the Supplementary Conditions:

SC-6.05.C. Amend the paragraph by making two subparagraphs under the title C. Engineer's Evaluation. The paragraph text is retitled, 6.05.C.2 After Effective Date of Agreement. A new paragraph is added before this paragraph to read as follows:

During Bidding. The Contract, if 1. awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents, or "or-equal" materials and equipment as defined in paragraph 6.05 of the General Conditions, or those substitute or materials and equipment approved by the ENGINEER and identified by Addendum. The materials and equipment described in the Bidding Documents establish a standard of required type, function, and quality to be met by any proposed substitute or "or-equal" item. Request for ENGINEER's clarification of materials and equipment considered "or-equal" prior to the Effective Date of the Agreement must be received by the ENGINEER at least 5 days prior to the date for receipt of Bids. No item of material or equipment will be considered by ENGINEER as a substitute

unless written request for approval has been submitted by Bidder and has been received by ENGINEER at least 15 days prior to the date for receipt of Bids. Each request shall conform to the requirements of paragraph 6.05 of the General Conditions. The burden of proof of the merit of the proposed item is upon the Bidder. ENGINEER's decision of approval or disapproval of a proposed item will be final. If ENGINEER approves any proposed substitute item, such approval will be set forth in an Addendum issued to all prospective Bidders. Bidders shall not rely upon approvals made in any other manner.

SC-6.06. Add the following new paragraphs immediately after paragraph 6.06G.

H. Within five (5) days of the bid opening and prior to the Notice of Award, the apparent successful Bidder shall provide to the ENGINEER a list of all subcontractors to be employed on this project. The apparent successful Bidder shall also identify the Amount of Work that each Subcontractor is employed to perform. The apparent successful Bidder shall complete a subcontractor form, to be provided by ENGINEER, showing a summary of subcontractor work on this project.

I. Prime Contractors shall not sublet the contract, nor any portion thereof, without the written consent of the OWNER. If the OWNER gives such consent, the CONTRACTOR shall perform with his own organization work amounting to at least 40% of the total contract amount and total labor. The subcontractor summary form, mentioned in SC-6.06H above, shall be used by the CONTRACTOR to demonstrate compliance with the above requirements. A subcontractor shall not sublet, sell, transfer, assign, or otherwise dispose of this contract with the CONTRACTOR, nor any portion thereof, or of this right title, or interest therein.

SC-7.01.A. The prime CONTRACTORS on this project are identified in their respective contract documents and within the official minutes of the project preconstruction conference.

SC-7.02.A.1. Delete paragraphs 7.02.A.1-3 in their entirety and insert the following:

1. The General CONTRACTOR shall be responsible for coordination of the activities among the other prime contractors and subcontractors on the Site to ensure a safe, efficient working environment. This authority covers scheduling delivery of materials, storage of materials, sequencing of construction involving different crafts, resolving interface issues between crafts, scheduling testing, and all other aspects of the Work that do not impact the design or function of the Work.

SC-9.03.A. Add the following language at the end of paragraph 9.03:

The Duties, Responsibilities, and Limitations of Authority of the Resident Project Representative will be as stated in Exhibit D of the OWNER-ENGINEER Agreement, 1910-1-FA, 1997 Edition, as amended and executed for this specific Project.

SC-11.03.C.1. Delete paragraph 11.03.C.1 in its entirety.

SC-14.02.A.2. Delete paragraph 14.02.A.2. in its entirety.

SC-16.01 Add the following new paragraphs immediately after paragraph 16.01.A.

B. Arbitration will not be used to settle claims disputes, and other matters. The parties involved shall attempt to resolve any claims, disputes or other matters by good faith negotiation. If such a negotiation is not successful, then litigation may be pursued as provided in paragraph SC-16.01C no later than 60 days after substantial completion of the project.

C. The contract Documents shall be constructed, governed, and interpreted under the law of the State of North Carolina. If any dispute should arise pertaining to these contract documents, such disputes shall be litigated and decided solely in the District Court Division or in the Superior Court Division of the General Court of Justice in the county where the project is being performed.

SC-18.08 Delete paragraph 18.08.A in its entirety and insert the following in its place:

A. Where this Contract exceeds \$100,000 CONTRACTOR shall comply with all the requirements of the Clean Air Act (42 U.S.C. §7414) and Section 308 of the Water Pollution Control Act (33 U.S.C. §1318) relating to inspection, monitoring, entry, reports, and information, as well as all other requirements specified in Section 114 of the Clean Air Act and Section 308 of the Water Pollution Control Act and all regulations and guidelines issued thereunder after the award of the contract. In so doing the Contractor further agrees:

1. As a condition for the award of contract, to notify the Owner of the receipt of any communication from the Environmental Protection Agency (EPA) indicating that a facility to be utilized in the performance of the contract is under consideration to be listed on the EPA list of Violating Facilities. Prompt notification is required prior to contract award.

2. To certify that any facility to be utilized in the performance of any nonexempt contractor subcontract is not listed on the EPA list of Violating Facilities pursuant to 40 CFR Part 32 as of the date of contract award.

3. To include or cause to be included the above criteria and the requirements in every nonexempt subcontract and that the Contractor will take such action as the Government may direct as a means of enforcing such provisions.

### GUIDELINES FOR RECRUITMENT AND SELECTION OF MINORITY BUSINESSES IN ACCORDANCE WITH NORTH CAROLINA SENATE BILL 914

In accordance with G.S. 143-128.2 (effective January 1, 2002) these guidelines establish goals for minority participation in single-prime bidding, separate-prime bidding, construction manager-at-risk, and alternative contracting methods on construction projects in the amount of \$300,000 or more. The legislation provides that the Public Entity shall have a verifiable ten percent (10%) goal for participation by minority businesses in the total value of work for each project for which a contract or contracts are awarded. These requirements are published to accomplish that end.

### SECTION A: INTENT

It is the intent of these guidelines that the Public Entity, as awarding authority for construction projects, and the contractors and subcontractors performing the construction contracts awarded, shall cooperate and, in good faith, do all things legal, proper and reasonable to achieve the statutory goal of ten percent (10%) for participation by minority businesses in each construction project as mandated by GS 143-128.2. Nothing in these guidelines shall be construed to require contractors or awarding authorities to award contracts or subcontracts to make purchases of materials or equipment from minority business contractors or minority business subcontractors who do not submit the lowest responsible, responsive bid(s).

### **SECTION B: DEFINITIONS**

- 1. <u>Minority</u> A person who is a citizen or lawful permanent resident of the United States and who is:
  - a. Black; that is, a person having origins in any of the black racial groups in Africa;
  - b. Hispanic; that is, a person of Spanish or Portuguese culture with origins in Mexico, South or Central America, or the Caribbean Islands, regardless of race;
  - c. Asian American; that is, a person having origins in any of the original peoples of the Far East, Southeast Asia, Asia, the Indian subcontinent and the Pacific Islands;
  - d. American Indian; that is, a person having origins in any of the original peoples of North America; or
  - e. Female.
- 2. <u>Minority Business</u> Means a business:
  - a. In which at least fifty-one percent (51%) is owned by one or more minority persons, or in the case of a corporation, in which at least fifty-one percent (51%) of the stock is owned by one or more minority persons or socially and economically disadvantaged individuals; and
  - b. Of which the management and daily business operations are controlled by one or more of the minority persons or socially and economically disadvantaged individuals who own it.

- 3. Socially and Economically Disadvantaged Individual Means the same as defined in 15 U.S.C. 637. "Socially disadvantaged individuals are those who have been subjected to racial or ethnic prejudice or cultural bias because of their identity as a member of a group without regard to their individual qualities". Economically disadvantaged individuals are those socially disadvantaged individuals whose ability to compete in the free enterprise system has been impaired due to diminished capital and credit opportunities as compared to others in the same business area who are not socially disadvantaged".
- 4. <u>Public Entity</u> Means local governmental units.
- 5. <u>Owner</u> The local government unit named in the contract.
- 6. <u>Designer</u> Any person, firm, partnership, or corporation, which has contracted with the Public Entity to perform architectural or engineering work.
- 7. <u>Bidder</u> Any person, firm, partnership, corporation, association, or joint venture seeking to be awarded a public contract or subcontract.
- 8. <u>Contract</u> A mutually binding legal relationship, or any modification thereof, obligating the seller to furnish equipment, materials or services, including construction, and obligating the buyer to pay for them.
- 9. <u>Contractor</u> Any person, firm, partnership, corporation, association, or joint venture which has contracted with the Public Entity to perform construction work or repair.
- 10. <u>Subcontractor</u> A firm under contract with the prime contractor or construction manager-at-risk for supplying materials, labor and/or installation. The subcontractor may or may not provide materials in his subcontract.

### SECTION C: RESPONSIBILITIES

1. <u>Office for Historically Underutilized Businesses</u>, Department of Administration (hereinafter referred to as HUB Office).

The HUB Office has established a program which allows interested persons or businesses qualifying as a minority business under G.S. 143-128.2 to obtain certification in the State of North Carolina procurement system. The information provided by the minority businesses will be used by the HUB Office to:

- a. Identify those areas of work for which there are minority businesses, as requested.
- b. Make available to interested parties a list of prospective minority business contractors and subcontractors.
- c. Assist in the determination of technical assistance needed by minority business contractors.

In addition to being responsible for the certification/verification of minority businesses that want to participate in the State construction program, the HUB Office will:

- a. Maintain a current list of minority businesses. The list shall include the areas of work in which each minority business is interested.
- b. Inform minority businesses on how to identify and obtain contracting and subcontracting opportunities through the Public Entity.
- c. Inform minority businesses of the contracting and subcontracting process for public construction building projects.
- d. Work with the North Carolina trade and professional organizations to improve the ability of minority businesses to compete in the public construction building projects.
- e. The HUB Office also oversees the minority business program by:
  - (1) Monitoring compliance with the program requirements.
  - (2) Assisting in the implementation of training and technical assistance programs.
  - (3) Identifying and implementing outreach efforts to increase the utilization of minority businesses.
  - (4) Reporting the results of minority business utilization to the Secretary of the Department of Administration, the Governor, and the General Assembly.

#### 2. <u>Owner</u>

Before awarding a contract, the owner shall do the following:

- a. Develop and implement a minority business participation outreach plan to identify minority businesses that can perform public building projects and to implement outreach efforts to encourage minority business participation in these projects to include education, recruitment and interaction between minority businesses and non-minority businesses.
- b. Attend the scheduled pre-bid conference.
- c. At least 10 days prior to the scheduled day of bid opening, notify minority businesses that have requested notices from the Public Entity for public construction or repair work and minority businesses that otherwise indicated to the Office for Historically Underutilized Businesses an interest in the type of work being bid or the potential contracting opportunities listed in the proposal. The notification shall include the following:
  - (1) A description of the work for which the bid is being solicited.
  - (2) The date, time and location where bids are to be submitted.

- (3) The name of the individual within the owner's organization who will be available to answer questions about the project.
- (4) Where bid documents may be reviewed.
- (5) Any special requirements that may exist.
- d. Utilize other media, as appropriate, likely to inform potential minority businesses of the bid being sought.
- e. Maintain documentation of any contacts, correspondence or conversation with minority business firms made in an attempt to meet the goals.
- f. Review, jointly with the designer, all requirements of G.S. 143-128.2(c) and G.S. 143-128.2(f) – (i.e. bidders' proposals for identification of the minority businesses that will be utilized with corresponding total dollar value of the bid and an affidavit listing good faith efforts, or an affidavit of self-performance of work, if the contractor will perform work under contract by its own workforce) - prior to recommendation of award.
- g. Evaluate documentation to determine that the good faith effort has been achieved for minority business utilization prior to recommendation of award.
- h. Make documentation showing evidence of implementation of owner's responsibilities available for review by the HUB Office, upon request.

#### 3. Designer

Under the single-prime bidding, separate-prime bidding, construction manager-at-risk or alternative contracting method, the designer will:

- a. Attend the scheduled pre-bid conference to explain minority business requirements to the prospective bidders.
- b. Assist the owner to identify and notify prospective minority business prime and subcontractors of potential contracting opportunities.
- c. Maintain documentation of any contacts, correspondence or conversation with minority business firms made in an attempt to meet the goals.
- d. Review jointly with the owner, all requirements of G.S. 143-128.2(c) and G.S.143-128.2(f) (i.e. bidders' proposals for identification of the minority businesses that will be utilized with corresponding total dollar value of the bid and an affidavit listing good faith efforts, or an affidavit of self-performance of work, if the contractor will perform work under contract by its own workforce) prior to recommendation of award.
- e. Make documentation showing evidence of implementation of designer's responsibilities available for review by the HUB Office, upon request.

### 4. Prime Contractor(s), Construction Manager-at-Risk and Its First-Tier Subcontractors

Under the single-prime bidding, the separate-prime biding, construction manager-at-risk and alternative contracting methods, contractor(s) will:

- a. Attend the scheduled pre-bid conference.
- b. Identify or determine those work areas of a subcontract where minority businesses may have an interest in performing subcontract work.
- c. At least ten (10) days prior to the scheduled day of bid opening, notify minority businesses of potential subcontracting opportunities listed in the proposal. The notification will include the following:
  - (1) A description of the work for which the sub-bid is being solicited.
  - (2) The date, time and location where sub-bids are to be submitted.
  - (3) The name of the individual within the company who will be available to answer questions about the project.
  - (4) Where bid documents may be reviewed.
  - (5) Any special requirements that may exist, such as insurance, licenses, bonds and financial arrangements.

If there are more than three (3) minority businesses in the general locality of the project who offer similar contracting or subcontracting services in the specific trade, the contractor(s) shall notify three (3), but may contact more, if the contractor(s) so desires.

- d. During the bidding process, comply with the contractor(s) requirements listed in the proposal for minority participation.
- e. Identify on the bid, the minority businesses that will be utilized on the project with corresponding total dollar value of the bid and an affidavit listing good faith efforts as required by G.S. 143-128.2(c) and G.S. 143-128.2(f).
- f. Make documentation showing evidence of implementation of Prime Contractor(s), Construction Manager-at-Risk and First-Tier Subcontractor responsibilities available for review by the HUB Office, upon request.
- g. Upon being named the apparent low bidder, the bidder shall provide one of the following: (1) an affidavit (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 applicable goal; (2) Affidavit D, if the percentage is not equal to the applicable goal, then documentation of all good faith efforts taken to meet the goal. Failure to comply with these requirements is grounds for rejection of the bid and subsequent award to the next lowest responsible and responsive bidder.

- h. During the construction of a project, at any time, if it becomes necessary to replace a minority business subcontractor, immediately advise the owner, the designer and the Director of the HUB Office, in writing, of the circumstances involved. The prime contractor shall make a good faith effort to replace a minority business subcontractor with another minority business subcontractor.
- i. If during the construction of a project, additional subcontracting opportunities become available, make a good faith effort to solicit sub-bids from minority businesses;
- j. It is the intent that these requirements apply to all contractors performing as prime contractor, first-tier subcontractor or construction manager-at-risk.

### 5. Minority Business Responsibilities

Minority businesses who are contacted by owners or bidders must respond promptly as to whether or not they wish to submit a bid.

### SECTION D: DISPUTE PROCEDURES

It is the policy of this State that disputes involving a person's rights, duties or privileges, should be settled through informal procedures. To that end, minority business disputes arising under these guidelines should be resolved as governed under G.S. 143-128(g).

#### MINORITY BUSINESS CONTRACT PROVISIONS (CONSTRUCTION)

### APPLICATION:

The Guidelines for Recruitment and Selection of Minority Businesses in Accordance with North Carolina Senate Bill 914 are hereby made a part of these contract documents. These guidelines shall apply to all contractors regardless of ownership.

### MINIMUM COMPLIANCE REQUIREMENTS:

All written statements, affidavits or intentions made by the Bidder shall become a part of the agreement between the Contractor and the Public Entity for performance of this contract. Failure to comply with any of these statements, affidavits or intentions, or with the minority business guidelines shall constitute a breach of the contract. A finding by the Public Entity that any information, submitted either prior to award of the contract or during the performance of the contract, is inaccurate, false or incomplete, shall also constitute a breach of the contract. Any such breach may result in termination of the contract in accordance with the termination provisions contained in the contract.

#### **INSTRUCTIONS:**

- 1. In accordance with G.S. 143-128.2(c), each bidder shall complete and submit the *"Identification of Minority Business Participation"* form, and Affidavits A and/or B (as applicable) with the bid. The proposed low bidder shall submit to the Owner Affidavits C and/or D (as applicable) within 72 hours of being notified of being the low bidder.
  - Note #1: An Affidavit C showing the portion of the work to be expended with minority business enterprises is equal to or greater than the verifiable percentage goal "shall give rise to the presumption" of adequate good faith efforts. No additional documentation from the Contractor, other than subcontracts with DBEs and their DBE certifications, will be required by the Public Entity.
  - Note #2: An Affidavit D showing the portion of the work to be expended with minority business enterprises is below the verifiable percentage goal requires additional documentation, including the documentation listed in Affidavit D itself.
  - Note #3: G.S. 143-128.2(d) limits substitution of subcontractors.

# Failure to file a required affidavit or documentation that demonstrates that the contractor made the required good faith effort is grounds for rejection of the bid [G.S. 143-128.2(c)].

- 2. The Owner shall complete and / or procure the following items within ten (10) working **days** of the notification of tentative award to the low bidder:
  - a. The "Owner's Affidavit of Good Faith Efforts" or the "Owner's Intent to Perform Work with Own Workforce (Force Account)", as applicable.

- b. Documentation of the Owner's good faith efforts including the following:
  - (1) the Owner's minority business participation outreach plan,
  - (2) the roster from the pre-bid meeting,
  - (3) the solicitation list the Owner maintains pursuant to G. S. 143-128.2 (e)(3),
  - (4) any list of contractors received from the Office of Historically Underutilized Businesses,
  - (5) solicitation letters sent to at least three of the contractors identified above. This solicitation letter must include all the elements laid out below [G. S. 143-128.2 (e)(3) a through e].
    - i. A description of the work for which the bid is being solicited.
    - ii. The date, time, and location where bids are to be submitted.
    - iii. The name of the individual within the Public Entity who will be available to answer questions about the project.
    - iv. Where bid documents may be reviewed.
    - v. Any special requirements that may exist.
- c. The Owner's affidavits of publication, or other documentation of advertising,
- d. Appropriate affidavits of good faith efforts for each Contractor,
- e. Documentation of each Contractor's good faith efforts including the following:
  - (1) If the Contractor completed Affidavit C, the Owner will require no additional documentation from the Contractor, other than verification of subcontracts and DBE certifications for each proposed DBE subcontractor. [G.S. 143-128.2(c)(1) a.]
  - (2) If the Contractor completed Affidavit D, all the documentation listed in Affidavit D, including DBE certifications for each proposed DBE subcontractor.
- 3. After being awarded the contract, the Contractor will send to the Owner executed copies of each subcontract awarded to a DBE subcontractor.

Note that G. S. 143-128.2(d) limits substitution of and requires good faith efforts be made to find DBE substitute subcontractors.

Note that G.S. 143-128.2(c)(2) requires the Contractor to provide to the Owner, within 30 days of award, a list of all identified subcontractors, whether DBE or not.

#### **OWNER'S GOOD FAITH EFFORTS:**

As laid out in G.S. 143-128.2 (e) the Owner must make <u>all</u> the good faith efforts listed below:

Before awarding a contract, a Public Entity shall do the following:

1. Develop and implement a minority business participation outreach plan to identify minority businesses that can perform public building projects and to implement outreach efforts to encourage minority business participation in these projects to include education, recruitment, and interaction between minority businesses.

- 2. Attend the scheduled pre-bid conference.
- 3. At least 10 days prior to the scheduled day of bid opening, notify minority businesses that have requested notices from the Public Entity for public construction or repair work and minority businesses that otherwise indicated to the Office of Historically Underutilized Businesses an interest in the type of work being bid or the potential contracting opportunities listed in the proposal. The notification shall include the following:
  - a. A description of the work for which the bid is being solicited.
  - b. The date, time, and location where bids are to be submitted.
  - c. The name of the individual within the Public Entity who will be available to answer questions about the project.
  - d. Where bid documents may be reviewed.
  - e. Any special requirements that may exist.
- 4. Utilize other media, as appropriate, likely to inform potential minority businesses of the bid being sought.

#### **CONTRACTOR'S GOOD FAITH EFFORTS:**

The good faith efforts to be made by the bidders/contractors (including subcontractors that further subcontract), as laid out in G.S. 143-128.2 (f), follow. Each contractor must earn at least 50 points with the good faith efforts listed below.

- 1. 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. (10 points)
- 2. 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. (10 points)
- 3. Breaking down or combining elements of work into economically feasible units to facilitate minority participation. (15 points)
- 4. Working with minority trade, community, or contractor organizations identified by the Office of Historically Underutilized Businesses and included in the bid documents that provide assistance in recruitment of minority businesses. (10 points)
- 5. Attending any pre-bid meetings scheduled by the Public Entity. (10 points)
- 6. Providing assistance in getting required bonding or insurance or providing alternatives to bonding or insurance for subcontractors. (20 points)
- 7. 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. (15 points)

- 8. 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. (25 points)
- 9. 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. (20 points)
- 10. Providing quick pay agreements and policies to enable minority contractors and suppliers to meet cashflow demands. (20 points)

### **Identification of Minority Business Participation**

I,

(Name of Bidder)

2

do hereby certify that on this project, we will use the following minority business enterprises as construction subcontractors, vendors, suppliers or providers of professional services.

| Firm Name, Address and Phone # | Work type | *Minority Category |
|--------------------------------|-----------|--------------------|
|                                |           |                    |
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|                                |           |                    |

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

### The total value of minority business contracting will be (\$)\_\_\_\_\_.

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

| Cou          | nty of  |
|--------------|---|
|              | (Name of Bidder)  |
| Affi         | lavit of<br>I have made a good faith effort to comply under the following areas checked:  |
| <b>D</b> ! 1 | I have made a good faith enort to comply under the fonts listed for their bid to be considered  |
| Bidd         | lers must earn at least 50 points from the good faith efforts listed for their bid to be considered onsive. (1 NC Administrative Code 30 I.0101)  |
| k            | -(10  pts) Contacted minority businesses that reasonably could have been expected to submit a quote and that were nown to the contractor, or available on State or local government maintained lists, at least 10 days before the bid date nd notified them of the nature and scope of the work to be performed.  |
| <b>2</b> 2   | (10 pts) Made the construction plans, specifications and requirements available for review by prospective minority pusinesses, or providing these documents to them at least 10 days before the bids are due.   |
|              | <b>5</b> – (15 pts) Broken down or combined elements of work into economically feasible units to facilitate minority participation.   |
| t<br>t       | <b>- (10 pts)</b> Worked with minority trade, community, or contractor organizations identified by the Office of Historically<br>Inderutilized Businesses and included in the bid documents that provide assistance in recruitment of minority<br>businesses.   |
|              | 5 - (10  pts) Attended prebid meetings scheduled by the public owner.   |
| f            | <b>5</b> – (20 pts) Provided assistance in getting required bonding or insurance or provided alternatives to bonding or insurance or subcontractors.  |
| 5            | <b>7</b> – (15 pts) Negotiated in good faith with interested minority businesses and did not reject them as unqualified without sound reasons based on their capabilities. Any rejection of a minority business based on lack of qualification should have the reasons documented in writing.   |
| (<br>1       | <b>B</b> – (25 pts) Provided assistance to an otherwise qualified minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letters of credit, including waiving credit that is ordinarily equired. Assisted minority businesses in obtaining the same unit pricing with the bidder's suppliers in order to help ninority businesses in establishing credit. |
|              | <b>9</b> – (20 pts) Negotiated joint venture and partnership arrangements with minority businesses in order to increase opportunities for minority business participation on a public construction or repair project when possible.   |
|              | <b>10 - (20 pts)</b> Provided quick pay agreements and policies to enable minority contractors and suppliers to meet cash-flow demands.   |
| Ider<br>exec | undersigned, if apparent low bidder, will enter into a formal agreement with the firms listed in the tification of Minority Business Participation schedule conditional upon scope of contract to be cuted with the Owner. Substitution of contractors must be in accordance with GS143-128.2(d) ure to abide by this statutory provision will constitute a breach of the contract.   |
| The<br>and   | undersigned hereby certifies that he or she has read the terms of the minority business commitment is authorized to bind the bidder to the commitment herein set forth.   |
| Date         | e:Name of Authorized Officer:   |
|              | Signature:  |
|              | Title:  |
|              |   |
|              | State of North Carolina, County of  |

| $ \land$ | State of North Carolina, County of             |  |
|----------|--|--|
|          | Subscribed and sworn to before me thisday of20 |  |
| SEAL     | Notary Public                                  |  |
|          | My commission expires                          |  |

MBE GUIDELINES: 12 OF 20

# State of North Carolina --AFFIDAVIT B-- Intent to Perform Contract with Own Workforce.

Affidavit of

(Name of Bidder)

I hereby certify that it is our intent to perform 100% of the work required for the \_\_\_\_\_

contract.

(Name of Project)

In making this certification, the Bidder states that the Bidder does not customarily subcontract elements of this type project, and normally performs and has the capability to perform and will perform <u>all</u> <u>elements of the work</u> on this project with his/her own current work forces; and

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

The undersigned hereby certifies that he or she has read this certification and is authorized to bind the Bidder to the commitments herein contained.

Date: \_\_\_\_\_Name of Authorized Officer: \_\_\_\_\_

| Signature:                             |          |
|--|----------|
| Title:                                 |          |
| SEAL                                   |          |
| State of North Carolina, County of     | _        |
| Subscribed and sworn to before me this | day of20 |
| Notary Public                          |          |
| My commission expires                  |          |

### State of North Carolina - AFFIDAVIT C - Portion of the Work to be **Performed by Minority Firms**

(Note this form is to be submitted only by the apparent lowest responsible, responsive bidder.)

If the portion of the work to be executed by minority businesses as defined in GS143-128.2(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.

I do hereby certify that on the Affidavit of (Name of Bidder)

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

| Attach additional sheets if requ |                       | <b>TTTTTTTTTTTTT</b> | Dollar Value |
|----------------------------------|-----------------------|----------------------|--------------|
| Name and Phone Number            | *Minority             | Work description     | Dollar value |
|                                  | *Minority<br>Category |                      |              |
|                                  | cutegory              |                      |              |
|                                  |                       |                      |              |
|                                  |                       |                      |              |
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|                                  |                       |                      |              |
|                                  |                       |                      |              |
|                                  |                       |                      |              |

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

Pursuant to GS143-128.2(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:  |                 |  |
| ( SEAL ) | Title:_   |                 |  |
|          | State of North Carolina, County<br>Subscribed and sworn to before<br>Notary Public<br>My commission expires | me thisday of20 |  |

### State of North Carolina

Affidavit of:

### AFFIDAVIT D – Good Faith Efforts

(Note this form is to be submitted only by the apparent lowest responsible, responsive bidder.)

If the goal of 10% participation by minority business <u>is not</u> achieved, the Bidder shall provide the following documentation to the Owner of his good faith efforts within <u>72 hours</u> after notification of being low bidder:

| (Name    | of | Ri | dd | e |
|----------|----|----|----|---|
| (1 tunio | O1 |    | uu |   |

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

| (Attach additional sheets if required) |           |                  |              |  |
|--|-----------|------------------|--------------|--|
| Name and Phone Number                  | *Minority | Work description | Dollar Value |  |
|  | Category  | _                |              |  |
|  |           |                  |              |  |
|  |           |                  |              |  |
|  |           |                  |              |  |
|  |           |                  |              |  |

\*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.

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:   | <br> |
|-------|--|------|
|       | Signature:   |      |
|       | Title:   | <br> |
| SEAL  | State of North Carolina, County of<br>Subscribed and sworn to before me this<br>Notary Public<br>My commission expires |      |

### Instructions for Affidavit D

Submitting Affidavit D indicates the bidder has not achieved the verifiable percentage goal for DBE participation. Therefore, the bidder must document the good faith efforts claimed in Affidavit A. The table below outlines the required documentation for each good faith effort listed in Affidavit A.

| required documentation for each good faith effort  |   |
|--|---|
| If you claimed this Good Faith Effort on   | you must substantiate it with the following   |
| Affidavit A  | documentation (cited in Affidavit D).   |
| Contacted minority businesses that reasonably<br>could have been expected to submit a quote and<br>that were known to the contractor, or available on<br>State or local government maintained lists, at<br>least 10 days before the bid date and notified<br>them of the nature and scope of the work to be<br>performed                   | <ol> <li>Owner requires three solicitations to DBEs for each<br/>subcontract specialty – if three DBEs are listed in the<br/>source solicitation list for that subcontract specialty.</li> <li>Each solicitation must include the information listed in<br/>G.S. 143-128.2 (e)(3) a through e (see instructions).</li> <li>For any subcontract specialty where a DBE was solicited<br/>and responded but not used, Owner needs proposals from<br/>the DBE and the low bidder (to ensure the DBE was<br/>underbid).</li> </ol> |
| Made the construction plans, specifications and<br>requirements available for review by prospective<br>minority businesses, or providing these<br>documents to them at least 10 days before the<br>bids are due.   | Generally taken care of by the Engineer and Owner making<br>the approved plans and specifications and bid documents<br>widely available (typically: Owner's office, Engineer's office,<br>AGC, and/or F.W. Dodge).  |
| Breaking down or combining elements of work<br>into economically feasible units to facilitate<br>minority participation.   | Owner will review the nature of subcontracts and determine if<br>they are of reasonable size and scope.   |
| Worked with minority trade, community, or<br>contractor organizations identified by the Office<br>of Historically Underutilized Businesses and<br>included in the bid documents that provide<br>assistance in recruitment of minority businesses.  | Documentation of any contacts or correspondence to minority<br>business, community, or contractor organizations in an<br>attempt to meet the goal   |
| Attending any prebid meetings scheduled by the public owner  | The Owner will submit a copy of the prebid roster.  |
| Providing assistance in getting required bonding<br>or insurance or providing alternatives to bonding<br>or insurance for subcontractors.  | Letter documenting efforts to provide assistance in obtaining<br>required bonding or insurance for minority business.   |
| Negotiated in good faith with interested minority<br>businesses and did not reject them as unqualified<br>without sound reasons based on their capabilities.<br>Any rejection of a minority business based on<br>lack of qualification should have the reasons<br>documented in writing.<br>Providing assistance to an otherwise qualified | <ol> <li>For subcontracts where a minority business firm is not<br/>considered the lowest responsible sub-bidder, copies of<br/>quotes or responses received from each firm (DBE or<br/>not) responding to the solicitation.</li> <li>Letter detailing reasons for rejection of minority business<br/>due to lack of qualification.</li> <li>Letter documenting proposed assistance offered to minority</li> </ol>  |
| minority business in need of equipment, loan<br>capital, lines of credit, or joint pay agreements<br>Assisting DBE in obtaining the same unit pricing<br>as the bidder with bidder's suppliers<br>Negotiating joint venture and partnership  | business.<br>The existence of such a joint venture or partnership itself, or  |
| arrangements with minority businesses.   | letter documenting proposed joint venture and partnership<br>arrangements offered to minority business.   |
| Providing quick pay agreements and policies to<br>enable minority contractors and suppliers to meet<br>cash-flow demands.  | Letter documenting proposed assistance offered to minority business.  |

### **Owner's Checklist and Affidavit of the Good Faith Efforts**

| Project Owner | Project #                                   |
|---------------|---|
| Project Name  |   |
| Affidavit of  |   |
|               | (Name of Owner's Authorized Representative) |

# I have made a good faith effort to comply with G.S. 143-128.2(e) under each of the following areas: (A "public entity" is required to make all of the efforts identified in order to have achieved a "good faith effort")

- Developed and implement a minority business participation outreach plan to identify minority businesses that can perform public building projects and to implement outreach efforts to encourage minority business participation in these projects to include education, recruitment, and interaction between minority businesses and nonminority businesses.
- □ Attended the scheduled prebid conference.
- □ At least 10 days prior to the scheduled day of bid opening, notified minority businesses that have requested notices from the Owner for public construction or repair work and minority businesses that otherwise indicated to the Office of Historically Underutilized Businesses an interest in the type of work being bid or the potential contracting opportunities listed in the proposal. The notification included the following:
  - a. A description of the work for which the bid is being solicited.
  - b. The date, time, and location where bids are to be submitted.
  - c. The name of the individual within the public entity who will be available to answer questions about the project.
  - d. Where bid documents may be reviewed.
  - e. Any special requirements that may exist.

Utilized other media, as appropriate, likely to inform potential minority businesses of the bid being sought.

I have attached to this affidavit the following documentation of the Owner's good faith efforts:

- □ the Owner's minority business participation outreach plan,
- □ the roster from the prebid meeting,
- $\Box$  the solicitation list the Owner maintains pursuant to G.S. 143-128.2 (e)(3),
- printouts of any list of contractors developed from the Office of Historically Underutilized Businesses or any other web-based resource,
- □ The Owner's affidavits of publication, or other documentation of advertising,

I have attached to this affidavit the following documentation of each proposed Contractor's good faith efforts:

- □ Appropriate affidavits of good faith efforts for each proposed Contractor,
- DBE certifications for each proposed DBE subcontractor,
- G For each proposed Contractor that completed Affidavit D, all the documentation listed in Affidavit D, and
- □ Verifications of subcontracts (optional).

The undersigned hereby certifies that the Owner has complied with the steps laid out in the resolution of this unit of local government and in the minority business participation outreach plan applying to this project, and that he or she has read this certification and is authorized to bind the Owner to the commitments herein contained.

| Date:                    | _ Authorized Representative:             |         |
|--------------------------|--|---------|
|                          | Signature:                               |         |
|                          | Title:                                   |         |
|                          | State of North Carolina, County of       |         |
| ( SEAL )                 | Subscribed and sworn to before me thisda | ay of20 |
|                          | Notary Public                            |         |
|                          | My commission expires                    |         |
| MBE GUIDELINES: 17 OF 20 |  |         |

### State of North Carolina -- Owner's Intent to Perform Work with Own Workforce.(Force Account)

| Project Owner                                  | Project #  |
|--|--|
| Affidavit of                                   | (Name of Owner)  |
| I hereby certify that                          | t it is our intent to perform 100% of the work required for the  |
|  | Project.   |
|  | (Name of Project)  |
| In making this certifit this project with his/ | cation, the Owner states that the Owner will perform <u>all elements of the work</u> on her own current work forces (force account); and |
| The Owner agrees to<br>Water Supply Sectio     | provide any additional information or documentation requested by the Public<br>n in support of the above statement; and                  |
| The undersigned her<br>Owner to the commi      | eby certifies that he or she has read this certification and is authorized to bind the tments herein contained.                          |
| Date:  | Authorized Representative:   |
|  | Signature:   |
|  | Title:   |
|  | State of North Carolina, County of   |
| ( SEAL )                                       | Subscribed and sworn to before me thisday of20   |
|  | Notary Public  |
|  | My commission expires  |

| Ō                 | uick Reference for Requir  | Quick Reference for Requirements of Session Law 2001-496 (Senate Bill 914)  | 914)   |
|-------------------|--|---|--|
|                   | 0  | wner's Responsibilities   |  |
| Authority         | Action   | Documentation/ Responsibility   | When Required                                  |
| G.S. 143-128.2(a) | Adopt a 10 % minority goal.<br>Local entity may continue to use a                      | <ul> <li>Provide a Resolution that establishes a "verifiable percentage<br/>goal."</li> </ul>   | Resolution and<br>Certification submitted with |
|                   | different verifiable goal adopted  | Provide a Certification that states the "verifiable percentage  | application                                    |
|                   | prior to December 1, 2001.   | goal" applies to the current project.   |  |
|                   | Local enuty may establish a<br>different verifiable goal upon<br>proper documentation. | <ul> <li>If verifiable goal different than 10%, then provide sufficient<br/>evidence to justify the goal (e.g. disparity study).</li> </ul> |  |
| G.S. 143-129(a)   | Formal Bidding   | <ul> <li>Threshold increased from \$100,000 to \$300,000 for</li> </ul>   | N/A  |
| amended by        |  | construction. DBE requirements apply.   |  |
| S. L. 2001-496    |  | <ul> <li>Threshold increased from \$30,000 to \$90,000 for purchase of</li> </ul>   |  |
|                   |  | materials, supplies, and equipment.   |  |
| G.S. 143-131(b)   | Informal Bidding   | <ul> <li>Threshold from \$5,000 to \$300,000 for construction. DBE</li> </ul>   | N/A  |
|                   |  | requirements apply.   |  |
|                   |  | <ul> <li>Document all efforts.</li> </ul>   |  |
|                   |  | <ul> <li>No requirement to formally advertise. Must submit your</li> </ul>  |  |
|                   |  | efforts to recruit DBEs, including type of project, total \$  |  |
|                   |  | amount of project, and total \$ amount to DBE contractor.   |  |
|                   |  | <ul> <li>Use informal bid projects to increase DBE participation.</li> </ul>  |  |
| G.S. 143-128.2(e) | Good Faith Efforts (GFE)   | <ul> <li>Solicit DBE firm and make it feasible for DBEs to submit</li> </ul>  | Send notice of bidding                         |
|                   | 1. Develop and implement a DBE   | successful bids.  | opportunity at least 10 days                   |
|                   | outreach program   | <ul> <li>Identify DBE firms that can perform projects (i.e. create DBE<br/>list)</li> </ul>   | prior to scheduled bid<br>opening              |
|                   |  | <ul> <li>Durante internation between DRFs and non-DRF firms</li> </ul>  | 0  |
|                   | 4. Use Media as appropriate  |   |  |
|                   |  | office for inquiries.   |  |
|                   |  | <ul> <li>Notice to DBEs to include: description of work, date, time</li> </ul>  |  |
|                   |  | and location for bid submittal, contact person, where bid   |  |
|                   |  | documents can be reviewed and any other special   |  |
|                   |  | requirements.   |  |
|                   |  | <ul> <li>Use media outlets, general circulation newspapers, local and<br/>statewide DRF newspapers and radio stations.</li> </ul>           |  |
|                   |  |   |  |

This quick reference outlines the changes made by Session Law 2001-496 (Senate Bill 914).

| erss' Responsibilities         Documentation of Minority<br>e work you must submit an affidavit<br>e work you must submit an affidavit<br>able percentage goal," then<br>able percentage goal," then<br>abpropriate<br>abpropriate<br>abpropriate<br>abpropriate<br>brovide a listing of all expected<br>business and statewide DBE<br>newspapers and radio<br>attations. List provided by<br>Owner or other state and<br>local agencies.         or<br>commically feasible units of work.<br>abusinesses and not reject them as<br>transmence or provide alternatives<br>origination newspapers and radio<br>stations. List provided by<br>Owner or other state and<br>local agencies.       0         orticy businesses in<br>ness participation on a public<br>points       - Identify DBEs on bid list.       0         orticy businesses in<br>ness participation on a public<br>points       - Identify DBEs on bid list.       0   |  | Quick Reference for Requirements of Session Law 2001-496 (Senate Bill 914)  | 01-496 (Senate Bill 91  | [4]   |
|--|--|---|---|---|
| Action         Action         Documentation/Responsibility           Provide an affidavit listing GFE. If performing all the work you must submit an affidavit is stating such.         Documentation/Responsibility           Provide more detailed documentation of list of DBEs solicited or awarded, amount and either Affidavit A or B, as appropriate and either Affidavit D.         Documentation Fefore, Affidavit A or B, as appropriate and either Affidavit C on D (including document your solicitation efforts (Affidavit D).           2)         Provide a listing of all expected submoting the "verifiable percentage goal," then documentation fefors (Affidavit D).         Documentation Fefore (Affidavit D).           2)         Provide a listing of all expected submotines (where DBE or not).         Earn fifty points with the good faith efforts listed below.         Use media outlets, general a circulation newspapers. local occuments of work.           3)         Make points with DBE are community or contractor organizations that provide a listing of all expected submoting or insurance or provide thematives.         Use media outlets, general a circulation newspapers. local occuments of a substances. List provides a listing or faustwise DBE for new commences of work.         Use media outlets, general a statewise DBE for new commences of submoting or insurance or provide a listing or new commentations.           5         Make DBE are on DBE for new commences of work.         Use media outlets, general a circulation newspapers.           6         Provide a listing of the new commences of work.         Use media outlets, general a statewise DBE for not a statewise DBE for not t  |  | Bidders' Responsibilities   |   |   |
| <ol> <li>Provide an affidavit listing GFE. If performing all the work you must submit an affidavit listing GFE. If performing all the work you must submit an affidavit listing GFE. If performing all the work you must submit an affidavit listing GFE. If performing all the work you must submit an affidavit listing such.</li> <li>provide more detailed documentation of list of DBEs solicited or awarded, amount contracted, and percentage. If not meeting the "wrifiable percentage goal," then Affidavit D) as appropriate appropriate documentation specified in the good faith efforts listed below.</li> <li>Provide a listing of all expected subcontracts (whether DBE or not).</li> <li>Provide a listing of all expected subcontracts (not interaction available.)</li> <li>Onder DBE using resources available. Io points</li> <li>Onder DBE using resources available. Io points</li> <li>Shread Points with DBE rade community or contractor organizations that provide the vork with DBE rade community or contractor organizations that provide the vork assistance in recruiting DBE firms. Io points</li> <li>Provide assistance in getting required bonding or insurance or provide laternatives</li> <li>Provide assistance in getting required bonding or insurance or provide alternatives to bonding or insurance for subcontractors. 20 points</li> <li>Provide assistance in perfigibilities. Any rejection of a minority business in need of equily the inder size and bonding or insurance for subcontractors. 20 points</li> <li>Provide assistance in perfigibilities. Any rejection of a minority businesses in obtaining the same unit provide by arguments in second for equipment, business pared on lack of qualification or house and partices in order to an obtaining the same unit provide by argumentices in order to anotherwise provide that is ordinarity requ</li></ol>   | Authority                                  | Action  | Documentation/ Responsibility   | When Required   |
| Provide more detailed documentation of list of DBEs solicited or awarded, amount<br>document your solicitation efforts (Affidavit D).Affidavit C or D (including<br>documentation specified in<br>Affidavit D), as appropriate<br>appropriate2)Provide a listing of all expected subcontracts (Mhether DBE or not).Provide a listing of all expected<br>aubcontracts (DBE or not).2)Earn fifty points with the good faith efforts listed below.Provide a listing of all expected<br>aubcontracts (DBE or not).2)Make plans & specification available for review. Io points<br>is points• Use media outlets, general<br>and statwide DBE3.Make plans & specification available for review. Io points<br>is points• Use media outlets, general<br>and statwide DBE4.Work with DBE trade community or contractor organizations that provide<br>a ssistance in recruiting DBE firms. Io points<br>is provide DBE• Use media outlets, general<br>orden assistance in getting required bonding or insurance or provide alternatives<br>to bonding or insurance for subcontractors. 20 points<br>is points• Use and statwide DBE<br>or noticitation newspapers and radio<br>stations. List provided by<br>Owner or other state and<br>local agencies.3.Attend merching DBE firms. Io points<br>is provide assistance in getting required bonding or insurance or provide alternatives<br>to bonding or insurance for subcontractors. 20 points<br>to bonding or insurance for autority business and not reject them as<br>unqualified without sound reasons based on lack of qualification should have the reasons<br>documented in writing. I spoints<br>supplies, or letters of credit, arobin paragress in need of<br>equired.9.Negotiate joint venture and partnership arrangements value dor<br>supplies, or increase opp  | G.S. 143-28.2(c)(1)<br>including (a) & (b) | Provide an affidavit listing GFE. If performing all the work you must submit an affidavit stating such.   | "Identification of Minority<br>Business Participation" Form,<br>and either Affidavit A or B, as<br>appropriate  | "on the bid"  |
| 2)         means your and the spected subcontracts (whether DBE or not).         mean spread and expected subcontracts (whether DBE or not).           Earn fifty points with the good faith efforts listed below.         Earn fifty points with the good faith efforts listed below.         Disponsible or not).           Earn fifty points with the good faith efforts listed below.         Use media outlets, general circulation newspapers, local and statewide DBE in the sources available for review. 10 points         Use media outlets, general circulation newspapers, local and statewide DBE in the sources available for review. 10 points           5. Attend pre-bid meetings scheduled by the polic owner. 10 points         S. Attend pre-bid meetings scheduled by the polits owner. 10 points           6. Attend pre-bid meetings scheduled by the polic owner.         Donding or insurance for subcontractors. 20 points           7. Negotiate in good faith with interested minority business and not reject them as unqualified without sound reasons based on their capabilities. Any rejection of a minority business based on lack of qualification should have the reasons unqualified without sound reasons based on their capabilities. Any rejection of a minority business based on lack of qualified minority business in need of equipment, loan activity businesses in catabilities. Any rejection of a minority businesses in obtaining the same unit pricing with the bidder's supplies, or letters of credit, or joint pay agreements to secure loans, supplies, or letters of credit, or joint pay agreements to secure loans, supplies in order to increase oportunities for minority businesses in obtaining the same unit pricing with the bidder's supplies, or letters of credit, including writing credit. 25 points      <  | G.S. 143-28.2<br>(c)(1)(a)                 | Provide more detailed documentation of list of DBEs solicited or awarded, amount<br>contracted, and percentage. If not meeting the "verifiable percentage goal," then<br>document volicitation of feature (A ferdicate D) | Affidavit C or D (including<br>documentation specified in   | 72 hours after notification<br>of apparent low bidder   |
| <ul> <li>Earn fifty points with the good faith efforts listed below.</li> <li>Contact DBE using resources available. 10 points</li> <li>Contact DBE using resources available. 10 points</li> <li>Make plans &amp; specification available for review. 10 points</li> <li>Breakdown or combine elements of work into economically feasible units of work.</li> <li>Breakdown or combine elements of work into economically feasible units of work.</li> <li>Breakdown or combine elements of work into economically feasible units of work.</li> <li>Work with DBE trade community or contractor organizations that provide assistance in recruiting DBE firms. 10 points</li> <li>Atted pre-bid meetings steduled by the public owner. 10 points</li> <li>Atted pre-bid meetings steduled by the public owner. 10 points</li> <li>Atted pre-bid meetings steduled by the public owner. 10 points</li> <li>Atted pre-bid meetings steduled by the public owner. 10 points</li> <li>Atted pre-bid meetings steduled by the public owner. 10 points</li> <li>Atted pre-bid meeting steduled by the public owner. 10 points</li> <li>Atted pre-bid meeting steduled by the public owner. 10 points</li> <li>Atted pre-bid meeting steduled by the public owner. 10 points</li> <li>Atted pre-bid meeting steduled by the public owner. 10 points</li> <li>Atted pre-bid meeting sted sted minority businesses and not reject them as unquilified with the treasons documented in writing. 15 points</li> <li>Provide assistance to an otherwise qualified minority businesses in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letters of credit, or joint pay agreements to secure loans, supplies, or letters of credit, including waiving credit that is ordinarily trequired. Assist minority businesses in establishing credit. 25 points</li> <li>Negotiate joint venture and partnership arrangements with the bidder's secure loans, supplies, to meet cash-flow demands 20 noints</li> <li>Provide quick pay agreements and policies to enable minority contractor</li></ul> | G.S. 143-28.2(c)(2)                        | Provide a listing of all expected subcontracts (whether DBE or not).  | Autudavit <i>D</i> ), as appropriate<br>Provide a listing of all expected<br>subcontracts (DBE or not).   | within 30- days (statute)   |
|  | G.S. 143-128.2(f)                          |   | <ul> <li>Use media outlets, general circulation newspapers, local and statewide DBE newspapers and radio stations. List provided by Owner or other state and local agencies.</li> <li>Identify DBEs on bid list.</li> </ul> | Provide Notice at least 10<br>days prior to scheduled<br>opening bids indicating<br>work to be performed. |

This quick reference outlines the changes made by Session Law 2001-496 (Senate Bill 914).

### APPENDIX TO GENERAL AND SUPPLEMENTARY CONDITIONS

### 1. HEALTH AND SAFETY REGULATIONS FOR CONSTRUCTION

The Contractor shall be responsible for the safety, efficiency, and adequacy of his equipment and methods, and for any damage which results from their failure or their improper construction, maintenance, or operation.

The Contractor shall maintain a current and accurate record of all cases of death, occupational disease, and injury requiring medical attention or causing loss of time from work, arising out of and in the course of employment on work under this Contract.

### 2. ADVERTISEMENT FOR BIDS

CONTRACTOR shall comply with the requirements of Article 2, Chapter 64 of the General Statutes. Further, if CONTRACTOR utilizes a subcontractor, CONTRACTOR shall require the subcontractor to comply with the requirements of Article 2 of Chapter 64 of the General Statutes." In lieu of the affidavit that we now use for formal bids.

### 3. NORTH CAROLINA SALES TAX REPORTS

In order that the Owner may fully recover all taxes to which he is legally entitled, which were paid on construction materials by the Contractor, the following procedures shall be followed by the Contractor on this project:

- A. The Contractor shall furnish the Owner, through the Engineer, documentary evidence showing materials used and sales taxes paid by the Contractor and each Subcontractor.
- 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. The certified statement shall show the name of the vendor, the invoice number, or numbers, covered and inclusive dates of such invoices. Copies of each invoice shall be attached to the certified statement.
- C. Materials used from the Contractor's or Subcontractor's warehouse stock shall be shown in the certified statement at warehouse stock prices.
- D. The Contractor shall not be required to certify the Subcontractor's statements.
- E. The Contractor shall submit this documentary evidence to the Engineer monthly, covering all items involved during the pay period, along with his request for payment. Prior to final project acceptance and payment, the Contractor shall furnish to the Engineer a sworn affidavit that all project items on which N. C. Sales Tax has been paid appears in the project documentation.

### 4. BASIS FOR DETERMINING RESPONSIVENESS AND RESPONSIBILITY OF LOW BIDDER

### APPENDIX TO GENERAL AND SUPPLEMENTARY CONDITIONS: 1 OF 3

For this Contract, responsiveness is defined by:

- A. The completeness and regularity of the Bid Form.
- B. A Bid Form without modifications unless requested in the technical specifications.

Responsibility may be based on whether the Bidder:

- A. Maintains a permanent place of business.
- B. Has adequate equipment to do the work properly and within the time limit established.
- C. Has adequate financial status to meet his obligations contingent to work.

### 5. <u>WITHHOLDING PAYMENT</u>

- A. The Engineer may withhold or, on account of subsequently discovered evidence, nullify the whole or part of any approved partial payment estimate to such extent as may be necessary to protect the Owner from loss on account of:
  - (a) Defective work not remedied.
  - (b) Claims filed or reasonable evidence indicating probable filing of claims.
  - (c) Failure to Contractor to make payments properly to subcontractors or for material or labor.
  - (d) A reasonable doubt that the work can be completed for the balance then unpaid.
  - (e) Damage to another Contractor.
  - (f) Performance of work in violation of the terms of the contract documents.
- B. Where work on unit price items are substantially complete but lack clean-up and/or corrections ordered by the Engineer, amounts shall be deducted from unit prices in partial payment estimates to amply cover such clean-up and corrections.
- C. When the above grounds are cured, payment shall be made for amounts withheld because of them.

### 6. <u>HIGHWAY AND RAILROAD ENCROACHMENTS</u>

All work performed within highway or railroad rights-of-way shall be in strict accordance with the APPENDIX TO GENERAL AND SUPPLEMENTARY CONDITIONS: 2 OF 3

terms and conditions of the encroachment agreement(s) issued by the land owner or controlling authority. Should there be a conflict between these contract documents and the encroachment agreement(s), the more stringent condition, as determined by the Engineer, shall prevail.

Copies of existing encroachment agreement(s) are available to the Bidder, upon request to the Engineer.

### 7. <u>CONFLICTS IN GENERAL CONDITIONS, SUPPLEMENTARY CONDITIONS AND/OR</u> <u>APPENDIX</u>

Should there be any conflict between the General Conditions, Supplementary Conditions and/or this Appendix, the more stringent condition, as determined by the Engineer, shall prevail.

### NOTICE TO PROCEED

|  | Dated  |
|--|--|
| ТО:                                      | ,  |
| (CONTRACTOR)                             |  |
| ADDRESS:                                 |  |
|  |  |
|  |  |
| Contract:                                |  |
| Project:                                 |  |
| 110jcct                                  |  |
|  |  |
| You are notified that the Contract       | Times under the above contract will commence to run on   |
| By that date, you are to start performin | g your obligations under the Contract Documents. In accordance with Article 4  |
| of the Agreement the date of Substantia  | I Completion is  |
|  | at the Site, paragraph 2.05.C of the General Conditions provides that you and  |
|  | (with copies to Engineer and other identified additional insureds) certificates of chase and maintain in accordance with the Contract Documents. |
| insurance which each is required to put  | enase and maintain in accordance with the Contract Documents.  |
| Also, before you may start any Wo        | ork at the Site, you must  |
|  |  |
|  |  |
|  |  |
|  |  |
|  | (OWNER)  |
| By:                                      |  |
| 25.                                      | (AUTHORIZED SIGNATURE)   |
|  |  |
|  | (TITLE)  |
| ACCEPTANCE OF NOTICE                     |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

#### FORM APPROVED OMB NO. 0575-0042

| OWNER:       CONTRACTOR:         CONTRACT CHANGE ORDER SUMMARY  | PAGE PERIOD OF ESTIMATE FROM TO ESTIMATE  |
|---|---|
| CONTRACT CHANGE ORDER SUMMARY         No.       Agency Approval       Amount       1. Original Contract .         Date       Additions       Deductions       2. Change Orders         Mole       Additions       Deductions       3. Revised Contract (1000)         Mole       Mole       Additions       Deductions       5. Stored Materials* | FROM TO<br>ESTIMATE   |
| No.     Agency Approval<br>Date     Amount     1. Original Contract.       Additions     Deductions     2. Change Orders       3. Revised Contract (1)     4. Work Completed*       5. Stored Materials*  | ESTIMATE  |
| No.     Agency Approval<br>Date     Amount     1. Original Contract.       Additions     Deductions     2. Change Orders       3. Revised Contract (1)     4. Work Completed*       5. Stored Materials*  |   |
| No.     Agency Approval<br>Date     Amount     1. Original Contract.       Additions     Deductions     2. Change Orders       3. Revised Contract (1)     4. Work Completed*       5. Stored Materials*  |   |
| Date     Additions     Deductions     2. Change Orders       3. Revised Contract (1)     4. Work Completed*       5. Stored Materials*  |   |
| <ol> <li>Work Completed*</li> <li>Stored Materials*</li> </ol>  |   |
| 5. Stored Materials*  |   |
|   |   |
| 6. Subtotal $(4+5)$   |   |
|   |   |
|   |   |
|   | s   |
| TOTALS 9. Amount Due (6-7-3<br>* Detailed breakdown   | -8)   |
| NET CHANGE  |   |
| CONTRACT TIME   |   |
| Original (days)   |   |
| Revised Yes Starting  | ng Date   |
| Keinaniing  | ted Completion  |
| The undersigned Contractor certifies that to the best of their<br>knowledge, information and belief the work covered by this payment<br>estimate has been completed in accordance with the contract quantities sh   | OR ENGINEER'S CERTIFICATION:<br>igned certifies that the work has been carefully<br>nd to the best of their knowledge and belief, the<br>hown in this estimate are correct and the work has<br>med in accordance with the contract documents. |
| Architect or En   | ngineer   |
| Contractor  |   |
| Ву  |   |
|   |   |
| APPROVED BY OWNER: The review a the correctnee been perform   | BY AGENCY:<br>and acceptance of this estimate does not attest to<br>ess of the quantities shown or that the work has<br>med in accordance with the contract documents.  |
| Owner By  |   |
|   |   |
| Date Date   |   |
|   |   |

According to the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0575-0042. The time required to complete this information collection is estimated to average 30 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

PARTIAL PAYMENT ESTIMATE FORM: 2 OF 2

RD 1924-18 REVERSE

ITEM ITEM \* As a minimum, detailed breakdowns should contain this information. DESCRIPTION TOTALS DESCRIPTION TOTALS TYPICAL LUMP SUM PRICE BREAKDOWN \* SCHEDULED VALUE QUANTITY CONTRACT (revised) THIS PERIOD U WORK COMPLETED TYPICAL UNIT PRICE BREAKDOWN \* UNIT PRICE \$ AMOUNT TO DATE COM-PLETE % QUANTITY OTHER (explain) STORED MATERIALS: WORK COMPLETED: THIS PERIOD DESCRIPTION MATERIALS STORED AT END OF THIS PAYMENT PERIOD TOTAL 6 AMOUNT TYPICAL STORED MATERIALS AND RETAINAGE BREAKDOWN \* \$ THIS ESTIMATE PERCENT QUANTITY RETAINAGE QUANTITY TOTAL TO DATE v. 69 VALUE UNIT AMOUNT S % ¥ RETAINED AMOUNT COM-PLETE

%

### WORK CHANGE DIRECTIVE

No. \_\_\_\_\_

| DATE OF ISSUANCE     | EFFECTIVE DATE         |  |
|----------------------|------------------------|--|
|                      |                        |  |
| OWNER                |                        |  |
| CONTRACTOR           |                        |  |
| Contract:            |                        |  |
| Project:             |                        |  |
| OWNER's Contract No. | ENGINEER's Project No. |  |
|                      |                        |  |

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

Purpose of Work Change Directive:

Attachments: (List documents supporting change)

If OWNER or CONTRACTOR believe that the above change has affected Contract Price any Claim for a Change Order based thereon will involve one or more of the following methods as defined in the Contract Documents.

Method of determining change in Contract Price:

Unit Prices
Lump Sum
Cost of the Work\_\_\_\_\_\_

| Estimated increase (decrease) in Contract Price:   | Estimated increase (decrease) in Contract Times |
|--|---|
| \$ .   | Substantial Completion: days;                   |
| If the change involves an increase, the estimated amount is not to be exceeded without further | Ready for final payment: days.                  |
| authorization.   |   |
|  |   |

**RECOMMENDED:** 

AUTHORIZED:

ENGINEER

By:

OWNER By: \_\_\_\_\_

EJCDC No. 1910-8-F (1996 Edition)

Prepared by the Engineers Joint Contract Documents Committee and endorsed by The Associated General Contractors of America and the Construction Specifications Institute.

|                    |  |   |   | OMB NO. 0575-0042 |  |
|--------------------|--|---|---|-------------------|--|
| Form RD 1924-7     |  |   | ORDER NO.   |                   |  |
| (Rev. 2-97)        | UNITED STATES DEPARTMENT OF AGRICULT                     | URE   |   |                   |  |
|                    | RURAL DEVELOPMENT AND                                    | FARM SERVICE AGENCY   |   | DATE<br>STATE     |  |
|                    | CONTRACT CHANGE ORDER                                    |   |   |                   |  |
|                    |  | Denney and an array   |   |                   |  |
| CONTRACT FOR       |  |   | COUNTY  |                   |  |
| OWNER              |  |   |   |                   |  |
| ТО                 |  |   |   |                   |  |
| -                  | (Contractor)   |   |   |                   |  |
|                    | You are hereby requested to comply with the following ch | to design the second |   |                   |  |
| (0 1               | Description of Changes                                   |   | DECREASE  | INCREASE          |  |
| (Supplem           | ental Plans and Specifications Attached)                 | 1n (  | Contract Price  | in Contract Price |  |
|                    |  | Φ   |   | Φ                 |  |
|                    |  |   |   |                   |  |
|                    | TOTAL  |   |   | ¢                 |  |
|                    | TOTAL  | 5 \$  |   | \$                |  |
|                    | NET CHANGE IN CONTRACT PRICE                             | Ξ\$   |   | \$                |  |
| JUSTIFICATION:     |  |   |   |                   |  |
|                    |  |   |   |                   |  |
|                    |  |   |   |                   |  |
| The amount of the  | Contract will be (Decreased)(Increased) By The S         | um Of <sup>.</sup>  |   |                   |  |
| The uniount of the |  | uni or.   |   |                   |  |
|                    |  |   | Dollars (\$   | ).                |  |
| The Contract Teta  | La la dia a dhia and annaisma Chan a Oadara Will         | Dec   |   |                   |  |
| The Contract Total | I Including this and previous Change Orders Will         | Be:   |   |                   |  |
|                    |  |   | Dollars (\$   | ).                |  |
|                    |  |   |   |                   |  |
| The Contract Perio | od Provided for Completion Will Be (Increased)(D         | ecreased)   | (Unchanged):  | Days.             |  |
| This document wil  | l become a supplement to the contract and all pro-       | visions wi  | ll apply hereto   |                   |  |
|                    | roccome a supprement to the contract and an pro          |   | in upply nereto.  |                   |  |
| Requested          |  |   |   |                   |  |
| D                  | (Signature of Owne                                       |   |   | (Date)            |  |
| Recommended        | (Signature of Owner's Architect/Enginee                  | <u>()</u>   |   | (Date)            |  |
| Accepted           | (g   | .,  |   | (2)               |  |
|                    | (Signature of Contracto                                  | r)  | efections of the structure of the structure                     | (Date)            |  |
| Approved by Agence | y(Name and Tit   |   | Non-State State State State State State State State State State |                   |  |
| Certification      |  | e)  |   | (Date)            |  |
|                    | (Signature of Owner's Finance Office                     | r)  |   | (Date)            |  |
| This change order  | r has been pre-audited in accordance with the            | ,   |   |                   |  |
| I and Community    | t Dudant and Eleval Control Act                          |   |   |                   |  |

Local Government Budget and Fiscal Control Act.

Public reporting burden for this collection of information is estimated to average 15 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to U.S. Department of Agriculture, Clearance Officer, STOP 7602, 1400 Independence Avenue, S.W., Washington, D.C. 20250-7602. Please DO NOT RETURN this form to this address. Forward to the local USDA office only. You are not required to respond to this collection of information unless it displays a currently valid OMB control number.

CONTRACT CHANGE ORDER FORM: 1 OF 1

POSITION 6

Form RD 1924-7 (Rev.2-97)

### **CERTIFICATE OF SUBSTANTIAL COMPLETION**

| DATE OF ISSUANCE     |                       |
|----------------------|-----------------------|
| OWNER<br>CONTRACTOR  |                       |
| Contract:            |                       |
| OWNER's Contract No. | ENGINEER's Project No |

This Certificate of Substantial Completion applies to all Work under the Contract Documents or to the following specified parts thereof:

| r | т | ٦. |
|---|---|----|
|   | L | 0  |
|   | л | U. |
|   |   |    |

OWNER

And To

CONTRACTOR

The Work to which this Certificate applies has been inspected by authorized representatives of OWNER, CONTRACTOR and ENGINEER, and that Work is hereby declared to be substantially complete in accordance with the Contract Documents on

#### DATE OF SUBSTANTIAL COMPLETION

A tentative list of items to be completed or corrected is attached hereto. 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 items in the tentative list shall be completed or corrected by CONTRACTOR within \_\_\_\_\_ days of the above date of Substantial Completion.

EJCDC No. 1910-8-D (1996 Edition) Prepared by the Engineers' Joint Contract Documents Committee and endorsed by The Associated General Contractors of America and the Construction Specifications Institute. The responsibilities between OWNER and CONTRACTOR for security, operation, safety, maintenance, heat, utilities, insurance and warranties and guarantees shall be as follows:

OWNER:\_\_\_\_\_

CONTRACTOR:

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

[For items to be attached see definition of Substantial Completion as supplemented and other specifically noted conditions precedent to achieving Substantial Completion as required by Contract Documents.]

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

| Executed by EN | GINEER on Date                                     |         |   |
|----------------|--|---------|---|
|                | ENGINEER   |         |   |
| By:            | (Authorized Signature)                             |         |   |
| CONTRACTOR     | accepts this Certificate of Substantial Completion | on Date |   |
|                | CONTRACTOR   | _       |   |
| By:            | (Authorized Signature)                             | _       |   |
| OWNER accepts  | s this Certificate of Substantial Completion on    | Date    | - |
|                | OWNER  |         |   |
| By:            | (Authorized Signature)                             |         |   |

# **DIVISION I - GENERAL REQUIREMENTS**

# DETAILED SPECIFICATIONS

# SECTION 0101 - PROJECT DESCRIPTION

# PART 1.00 - GENERAL

### 1.01 Description

The basic work included in this project includes, but is not limited to, the following:

- One (1) 2,740 SF single story splitface CMU convenience building complete with restrooms, offices, storage & concessions to include all HVAC, electrical and plumbing.
- One (1) 2,740 SF Metal Framed Picnic Shelter.
- One (1) 24,750 SF Metal Framed (Open Sided) Structure (Pickleball Complex) to include all electrical, lighting, CMU Entrance, concrete slab and eight (8) Pickleball Courts.
- Entrance Road and Parking Lot (asphalt with 24" curb and gutter).
- Two (2) 3-Court Pickleball Facilities including concrete court base, nets, poles and fencing.
- Two (2) 6-Court Tennis Court Facilities including asphalt court, base, nets, poles and fencing.
- Concrete Plaza and 0.5 Mile Asphalt Walking Track.
- One (1) Croquet Court, Three (3) Bocce Ball Courts and Three (3) Horseshoe Pits.
- Site grading includes storm drainage piping, structures and erosion control measures.
- Water and sewer services including a duplex grinder pump station.

The intent of this Section is to provide a general project description to aid each Bidder in understanding the overall scope of the project and the work included in the Contract.

# PART 2.00 - PRODUCTS

All material and product descriptions are included in the other applicable sections of these specifications and/or as shown on the project drawings.

### PART 3.00 - EXECUTION

As described in the Bid proposed, these detailed specifications and the project drawings.

# END OF SECTION

# **DIVISION 1 - GENERAL REQUIREMENTS**

# **DETAILED SPECIFICATIONS**

# **SECTION 0110 - PROJECT MEETINGS**

### PART 1.00 - GENERAL

### 1.01 Description

The work covered in this section includes attendance and participation in (1) preconstruction conference and monthly project meetings.

The purpose of the <u>preconstruction conference</u> is to enable all of the parties having an interest in this project to meet, exchange preliminary ideas and schedules, and lay the groundwork for the project.

The <u>periodic project</u> meetings shall be conducted by the Engineer throughout the construction period to enable orderly review of progress during construction and to provide for systematic discussion of problems.

These periodic project meetings, in general, will be held monthly at the job site, or at a location and time schedule mutually acceptable to the Contractor, Engineer, and other involved parties.

# 1.02 Quality Assurance

Persons designated by the Contractor to attend and participate in project meetings shall have all required authority to commit the Contractor to solutions as agreed upon in the project meetings.

## 1.03 <u>Submittals</u>

# A. <u>Agenda Items</u>

To the maximum extent possible, advise the Engineer, at least 24 hours in advance of the project meeting, regarding all items to be added to the agenda.

# B. Minutes

The Engineer will compile minutes of each project meeting and will distribute copies to the Owner and the Contractor. The Contractor may make and distribute such other copies as he wishes.

# PART 2.00 - PRODUCTS

No products are required in this Section.

# PART 3.00 - EXECUTION

### 3.01 Meeting Schedule

Coordinate with Engineer to establish a mutually acceptable schedule for project meetings.

# 3.02 <u>Meeting Location</u>

If possible, project meetings shall be held at the job site; otherwise, location will be worked out with Engineer.

### 3.03 Attendance

The Contractor shall have a representative present at the preconstruction conference and all periodic project meetings, unless previous arrangements are approved by the Engineer.

To the maximum extent practicable, the Contractor shall assign the same person or persons to represent his interest at all project meetings throughout the construction period. Subcontractors, suppliers, and others may be invited to attend project meetings in which their aspects of the work are involved.

# END OF SECTION

PROJECT MEETINGS

# **DIVISION I - GENERAL REQUIREMENTS**

# **DETAILED SPECIFICATIONS**

# **SECTION 0120 - SUBMITTALS & SUBSTITUTIONS**

### PART 1.00 - GENERAL

### 1.01 Description

Wherever possible throughout the Contract Documents, the minimum acceptable quality of workmanship and materials has been defined either by manufacturer's name and catalog number or by reference to recognized industry standards.

To ensure that the specified materials and products are furnished and installed in accordance with the design intent, the herein established procedures shall be followed for submittal of design data and for its review and approval, or rejection, by the Engineer.

### 1.02 Product Handling

Make all pre-submittals, shop drawings, requests for substitutions, and other items in strict accordance with the provisions of this Section of the specifications.

### PART 2.00 - PRODUCTS

### 2.01 <u>Pre-submittals and Shop Drawings</u>

<u>Data</u> shall include all drawings, design, performance curves, construction materials, installation requirements, capabilities, and any additional information available to allow the Engineer to adequately evaluate the product for the proposed application.

<u>Scale</u> of drawings shall be sufficiently large to show all pertinent features of the items and its method of connection to the work.

Number of sets of each submittal shall be as follows:

A. Pre-submittals - 2 sets B. Shop Drawings - 5 sets

# 2.02 <u>Colors</u>

Unless the precise color is specifically described in the Contract Documents, whenever a choice of color is available in a specified product, submit accurate color charts to the Engineer for his review and selection.

# 2.03 <u>Substitutions</u>

- A. Engineer's approval required:
  - 1. The Contract is based on the materials, equipment, and methods described in the Contract Documents.
  - 2. The Engineer will consider proposals for substitution of materials, equipment, and methods only when such proposals are accompanied by full and complete technical data and all other information required by the Engineer to evaluate the proposed substitution.
  - 3. Do not substitute materials, equipment, or methods unless such substitution has been specifically approved for this work by the Engineer.
- B. "Or equal":
  - 1. Where the phrase "or equal" or "or approved equal" occurs in the Contract Documents, do not assume that material, equipment, or methods will be approved as equal unless the item has been specifically approved for this work by the Engineer.
  - 2. The decision of the Engineer shall be final.

# 2.04 Operation and Maintenance Manuals

A. General:

O&M Manuals shall be furnished by the manufacturer for all equipment, unless otherwise specifically directed by the Engineer. These manuals shall be prepared in durable binders approximately 8 1/2" by 11" in size and with at least the following items:

- 1. Identification on, or readable through, the front cover stating general nature of the manual.
- 2. Neatly typewritten index near the front of the manual, furnishing immediate information as to location in the manual of all emergency data regarding the

installation.

- 3. Complete instructions regarding operation and maintenance of all equipment involved.
- 4. Complete nomenclature of all replaceable parts, their part numbers, current cost, and name and address of nearest vendor of parts.
- 5. Copy of all guarantees and warranties issued.
- B. Extraneous data:

Where contents of manuals include manufacturer's catalog pages, clearly indicate the precise items included in this installation and delete, or otherwise clearly indicate, all manufacturer's data with which this installation is not concerned.

C. Number of copies required:

Unless otherwise specifically directed by the Engineer, deliver three (3) copies of the manual to the Engineer.

- 2.05 Other Submittals Required
  - A. Construction Schedule Updated every 4 months
  - B. Project Cash Flow (Cumulative)
  - C. Monthly Partial Payment Requests
  - D. Sales Tax Reports
  - E. Subcontractor Approval Request
  - F. Bonds for Highway Department (where applicable)
  - G. Insurance Certificate for Railroad (where applicable)
  - H. Payrolls (EPA & HUD Projects only)
  - I. As-Built Construction Drawings

# PART 3.00 - EXECUTION

# 3.01 Prequalification of Equipment

When the detailed specification for any equipment or material requires prequalification, these submittals shall be sent or delivered to the Engineer at least fifteen (15) days prior to the scheduled date for receiving and opening bids.

## 3.02 Shop Drawings

The Contractor shall submit shop drawings to the Engineer for all products, equipment, and material to be used on this project, regardless of whether the item is listed in the specifications or not. Pipe manufacturer's certification of materials shall be acceptable for specified items.

Shop drawings should be submitted at least fifteen (15) days in advance of anticipated project usage to allow for the Engineer's review and approval, or rejection.

Unapproved items shall not be acceptable on this project.

# 3.03 <u>Submittal Schedule</u>

The following provides a listing of the minimum submittal times for the other items listed in Part 2.00 of this specification:

- A. Colors Fifteen (15) days prior to need
- B. O&M Manuals Prior to 40% project completion
- C. Construction Schedule Prior to preconstruction conference
- D. Projected Cash Flow Prior to preconstruction conference
- E. Partial Payment Requests Monthly
- F. Sales Tax Reports Monthly, with Payment Requests
- G. Payrolls Weekly (when required)
- H. Subcontractor Approval Request Fifteen (15) days prior to need
- I. Highway Bonds Seven (7) days prior to highway work
- J. Railroad Bonds Fifteen (15) days prior to railroad work

### 3.04 Miscellaneous Submittals

To be resolved with the Engineer at least fifteen (15) days prior to need.

### 3.05 As-Built Construction Drawings

The Contractor shall maintain and keep up-to-date a set of "as-built" drawings of the project work. These shall be protected and kept on the project for inspection. At project completion these "as-built" drawings shall be turned over to the Engineer.

# 3.06 Submittal Revisions

A revised Construction Schedule shall be submitted to the Engineer within seven (7) days after the construction progress varies 10% of more from the current Construction Schedule for two consecutive months, or at any other time when the Contractor desires to permanently alter the planned schedule.

# **END OF SECTION**

# **DIVISION 1 - GENERAL REQUIREMENTS**

# **DETAILED SPECIFICATIONS**

# **SECTION 0140 - TEMPORARY FACILITIES AND CONTROLS**

### PART 1.00 - GENERAL

### 1.01 Description

The temporary facilities and controls covered in this Section include, but are not necessarily limited to:

- A. All utilities, including water, sewer, gas, electricity and/or telephone, except as noted otherwise in these specifications
- B. Field offices and sheds
- C. Storage yards
- D. Sanitary facilities
- E. Safety measures

# 1.02 <u>Product Handling</u>

Use all means necessary to maintain temporary facilities and control in proper and safe condition throughout progress of the work. In the event of loss or damage, immediately make all repairs and replacements necessary to the approval of the Engineer and at no additional cost to the Owner.

# PART 2.00 - PRODUCTS

### 2.01 <u>Temporary Utilities</u>

A. General:

Each contractor shall provide and pay all costs for all gas, water, and electric required for the performance of the work, by he or his subcontractors.

B. Temporary gas and water:

- C. Temporary electricity:
  - (1) Furnish and install all necessary temporary wiring.
  - (2) Furnish and install area distribution boxes so located that the individual trades may use their own construction-type extension cords to obtain adequate power and artificial lighting at all points where required by inspectors and for safety (when required for buildings).

# 2.02 Field Office

When field offices are located at the job, the Contractor shall make the field office available to the Engineer or his representatives.

# 2.03 <u>Sanitary Facilities</u>

Furnish and install all required temporary toilet buildings with sanitary toilets for use of all workmen; comply with all minimum requirements of the Health Department or other public agency having jurisdiction; maintain in a sanitary condition at all times.

# 2.04 <u>Safety Measures</u>

The Contractor shall comply with all safety and health requirements of:

- A. Contract General Conditions; Special Conditions; Supplemental Conditions; FmHA, EPA, and/or HUD Conditions (when applicable)
- B. Occupational Safety and Health Act of 1970 (P.L. 91-596) with any amendments
- C. North Carolina Department of Labor
- D. U.S. Department of Labor Safety and Health Regulations promulgated under Section 107 of the Contract Work Hours and Safety Standards Act (P.L. 91-54)
- E. Associated General Contractors' "Manual of Accident Prevention in Construction"
- F. Local Health Department

# 2.05 <u>Use of Explosives</u>

When the use of explosives is necessary for the prosecution of the work, the Contractor shall exercise the utmost care not to endanger life or property. The Contractor shall be responsible for any and all damage or injury to persons or property resulting from the use of explosives. Such responsibility shall include, but shall in no way be limited to all

# TEMPORARY FACILITIES & CONTROLS

damages arising from all forms of trespass to adjacent property as a result of blasting by the Contractor.

All explosives shall be stored in a secure manner, in compliance with all laws, and all such storage places shall be marked clearly "DANGEROUS EXPLOSIVES."

The Contractor shall notify the City of Wilson Engineering Department (252) 399-2465 at least 48 hours in advance of using explosives on the project site. Likewise, the Contractor shall notify each public utility company having facilities in close proximity to the site of the work of his intention to use explosives. This notice shall be given sufficiently in advance to enable the utility companies to take whatever steps they may consider necessary to protect their property from injury. The Contractor shall also give the Engineer, all occupants of adjacent property, and all other Contractors working in or near the project notice of his intention to use explosives.

# 2.06 Protection and Restoration of Property

The Contractor shall be responsible for the protection from his activities of all public and private property on and adjacent to the work and shall use every reasonable precaution necessary to prevent damage or injury thereto. He shall use suitable precautions to prevent damage to pipes, conduits, and other underground structures, and to poles, wires, cables, and other overhead structures.

The Contractor shall protect carefully from disturbance or damage all land monuments and property markers until the Engineer has witnessed or otherwise referenced their location and shall not remove them until directed.

The Contractor shall be responsible for the removal, preservation, and resetting of all mail boxes disturbed by the construction operations. The mail boxes and their supports, when reset, shall be left in as good a condition as they were before removal. The Contractor will not be required to furnish new material except as required to repair damage resulting from construction operations.

The Contractor will be held responsible for all damage or injury to property of any character resulting from any act, omission, negligence, or misconduct in the prosecution of the work. When any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, negligence, or misconduct in the execution of the work, he shall either restore at his own expense such property to a condition similar or equal to that existing before such damage or injury was done, or shall make good such damage or injury in a manner acceptable to the owner of the damaged property. In case of failure on the part of the Contractor to restore such property or make good such damage or injury the Project Owner may be the Contractor's expense repair, rebuild, or otherwise restore such property in such manner as the Engineer may consider necessary.

# PART 3.00 - EXECUTION

# 3.01 Removal

Maintain all temporary facilities and controls as long as needed for the safe and proper completion of the work; remove all such temporary facilities and control as rapidly as progress of the work will permit or as directed by the Engineer.

# **END OF SECTION**

# **DIVISION 1 - GENERAL REQUIREMENTS**

# **DETAILED SPECIFICATIONS**

# **SECTION 0150 - PROJECT CLOSEOUT**

# PART 1.00 - GENERAL

### 1.01 Description

The work covered by this Section includes, but is not limited to, the following items:

- A. Final Project Inspections
- B. Operation and Maintenance Manuals

# **PART 2.00 - PRODUCTS**

### 2.01 <u>Final Inspections</u>

At such time as the Contractor and the Project Inspector together agree that the Work has been completed in accordance with the project drawings and the contract documents, the Contractor shall request, in writing, that the Engineer conducts a final inspection.

The Engineer shall notify the other parties who need to make inspections, including where applicable but not limited to the Owner, N. C. Department of Transportation, Farmers Home Administration, N. C. Department of Environment, Health and Natural Resources – Division of Land Quality and the Division of Water Quality.

The Engineer shall coordinate the final inspections with the Owner, the Contractor and all others requiring such inspections.

Upon completion of his final inspection, the Engineer shall provide the Contractor with his "punch list" of items needing additional work. Punch lists from other agencies involved shall be provided to the Contractor also for his attention and correction.

When the Contractor has completed all work to the satisfaction of all agencies involved, the Engineer shall issue to the Contractor a letter of project acceptance, stating the acceptance date and the project warranty period.

# 2.02 Operation and Maintenance Manuals

The Contractor shall bind and furnish operation and maintenance manuals as required by these detailed specifications for all equipment items in accordance with the Submittals schedule.

# PART 3.00 - EXECUTION

Shall be as described in these Detailed Specifications.

# **END OF SECTION**

PROJECT CLOSEOUT

# 00950 - MEASUREMENT & PAYMENT (CITY FUNDED PROJECTS)

(Last revised 5/20/10)

SELECTED LINKS TO SECTIONS WITHIN THIS SPECIFICATION Base Course & Paving Curb & Gutter, Driveways, Sidewalks & Misc. Concrete Earthwork Items Miscellaneous to all sections Trenching, Backfilling & Compaction of Utilities Sanitary Sewer Storm Drainage Water Distribution

### 1.1 TRENCHING, BACKFILLING AND COMPACTION OF UTILITIES

Measurements for purpose of payment shall be in accordance with the unit quantities stated in the proposal as defined below. Whenever units of measure, (i.e. linear feet, each, and similar units of measurement) are mentioned in a proposal, it shall be interpreted to mean the unit installed in accordance with the plans and specifications, and ready for use. Prices for the following bid items shall include all labor, materials, tools, equipment, and other incidentals necessary to complete the work as shown on the plans and in accordance with these specifications.

### A. Aggregate Backfill:

**Measurement**: Coarse granular fill will be measured by the cubic yard in place in the trench.

**Payment**: Price per cubic yard for coarse granular fill shall include all materials, equipment, and labor required to furnish and install #57 or #67 stone in the locations designated by the City Engineer.

### B. Bedding, Haunching, Crushed Stone for Sewer Mains:

Measurement: Bedding stone is considered incidental to the cost of the pipe.

Payment: Not a pay item.

### C. Excavation and Backfill:

**Measurement and Payment**: All excavation and backfill shall be included in the cost of the other items bid – not a pay item.

When the removal of existing structures or materials is classified separately as a contract pay item, payment will be made in accordance with the contract price; otherwise, such work will be considered as incidental work and will not be paid for directly, but the cost shall be included in the unit price for other items of work. In either case, such price or prices shall be full compensation for all labor, materials, tools, equipment, and incidentals necessary to complete the work.

#### D. Exploratory Excavation

**Measurement:** Such excavation, where ordered by the City Engineer will be measured by the cubic yard.

**Payment:** The cost of such excavation, where ordered by the City Engineer, will be paid at the contract unit price bid, per cubic yard.

#### E. Foundation Stone:

**Measurement**: Foundation stone used in stabilizing the bottom of trenches will be field measured in the trench by the cubic yard, complete in place.

**Payment**: When the City Engineer directs the use of foundation stone, foundation stone shall be paid for at the contract unit price for foundation stone by the cubic yard. Payment shall include all materials and labor incidental to the placing of the stone and any additional extra depth of trench or excavation necessary to accommodate the stone including disposal of unusable material necessary to allow for placement of the foundation stone.

#### F. Pavement Removal and Replacement

**Measurement**: Where pavement is encountered, as shown on the plans, pavement removal and replacement will be measured by the square yard regardless of the existing pavement material or depth. See Specification Section 02275 – *Trenching, Backfilling, and Compaction of Utilities*, paragraph 3.7, *Pavement Repair and Replacement*.

**Payment**: This item will be paid for at the contract unit price per square yard for pavement removal and replacement. The unit price bid shall include all labor, tools, equipment, and material necessary to complete the work and shall include, but is not necessarily limited to, saw cutting the pavement, removal of existing pavement materials which are not suitable for backfilling the trench from the job, placement of suitable backfill material, and the cost for compaction and compaction testing by a certified and approved laboratory. In the case of pavement cut and removal, such price or prices shall include the cost of the required permit for cutting pavement, unless permit fees are included as a bid item in the Contract Documents. Extra width will not be measured for payment and there will be no extra payment for any of the above work, the cost of which shall be included in the unit price bid for payement removal and replacement.

#### G. Portland Cement Concrete Sidewalk

**Measurement**: Where existing concrete sidewalk is encountered, as shown on the plans, removal and replacement will be measured by the square yard of sidewalk ordered removed and replaced by the City Engineer, regardless of the depth of the existing sidewalk.

**Payment**: This item will be paid for at the contract unit price per square yard for removal and replacement of concrete sidewalk, depth to match the depth removed with no extra compensation for depth. The unit price bid shall include all labor,

tools, equipment, and material necessary to complete the work and shall include, but is not necessarily limited to, saw cutting the sidewalk, removal of all existing materials, which are not suitable for backfill in the trench from the job, compaction of the trench and replacement of the sidewalk.

# H. Remove and Replace Asphalt Drive and Remove and Replace Concrete Drive

**Measurement**: Where either an existing asphalt or concrete drive is encountered, as shown on the plans, pavement removal and replacement will be measured by the square yard regardless of the existing pavement material or depth.

**Payment**: This item will be paid for at the contract unit price per square yard for removal and replacement of either asphalt or concrete drives. The unit price bid shall include all labor, tools, equipment, and material necessary to complete the work and shall include, but is not necessarily limited to, saw cutting the pavement, removal of all paving materials which are not suitable for backfill in the trench from the job, and compaction of the trench. There will be no extra payment for any of the above work, the cost of which shall be included in the unit price bid for removal and replacement of asphalt or concrete drives.

### I. Resurfacing Existing Pavement

### [Alternate 1: By the ton using Terminal Prices for adjustment]

**Measurement**: Asphalt concrete pavement shall be measured by the actual number of tons of plant mix completed and accepted on the job. Measurement for all roadways will be based on plan quantities and field measurements, verified by tonnage tickets unless otherwise directed by the City Engineer.

**Payment**: Asphalt concrete pavement will be paid for at the "Contract Unit Price" bid per ton for the type of asphalt concrete specified. However, the "Contract Unit Price" per ton will be adjusted to account for variations either up or down in the price of <u>asphalt binder</u> from a "Base Price Index" to yield an "Adjusted Contract Unit Price." The "Adjusted Contract Unit Price" is the price paid at the time the paving/work is placed or performed. The "Adjusted Contract Unit Price" shall be full compensation for asphalt concrete pavement, complete in place, including all materials, labor, tools, equipment, tack coat, maintenance of traffic, and all other incidentals necessary. Adjusting manholes, cleanouts, valve boxes, etc. will be paid separately at the bid price for each when adjusted by the Contractor. Payment will be made on a per ton basis.

### PRICE ADJUSTMENT - ASPHALT BINDER FOR PLANT MIX:

When it is determined that the monthly selling price of asphalt binder on the first business day of the calendar month during which the last day of the partial payment period occurs varies either upward or downward from the "Base Price Index," the "Contract Unit Price" for <u>asphalt binder</u> for plant mix will be adjusted.

The "Base Price Index" provided for asphalt binder for plant mix, per ton, shall be used to compute the "Adjusted Contract Unit Price." The "Base Price Index" to be included in a proposal/contract along the applicable date will be the Monthly Price Index in effect 2 months prior the month in which the contract is let. The "Base Price Index" will remain fixed throughout the life of the contract. This "Base Price Index" represents an average of F.O.B. selling prices of asphalt binder at supplier's terminals.

Price adjustments for asphalt binder for plant mix will be made in accordance with Section 620 of the NCDOT *Standard Specifications*.

[BIDDING NOTE: In preparation of the bid documents, the City must indicate the "Base Price Index" for asphalt binder for plant mix per ton in the form of proposal. Along with this price, show the date of the selling prices of asphalt binder at supplier's terminal. The price and date is obtained from the DOT's website and then inserted into the bid documents.]

The following is a link to the NCDOT website showing the terminal price:

http://www.ncdot.org/doh/operations/dp%5Fchief%5Feng/constructionunit/atp.html

### [Alternate 2: By the SY]

**Measurement**: Payment for resurfacing existing pavement will be made at the unit price bid per square yard in accordance with field measurements made by the City.

**Payment:** The unit price bid shall include all labor, tools, equipment, and material necessary to complete the work and shall include, but is not necessarily limited to, saw cutting the pavement if necessary, adjusting valves and manholes, and meeting density requirements. Payment will be made per square yard of surface covered. Core samples shall be taken by the Contractor in areas directed by the City. The average depth of the asphalt will be determined from these samples. The unit price paid will be reduced proportionately for each 1/8 inch thickness below the specified thickness. Thicknesses less than 75% of that specified shall receive an additional overlay at the minimum depth recommended by NCDOT for the type of asphalt specified for this project. No additional payment will be made for thicknesses greater than that designed.

J. Rock Excavation, Trench:

**Measurement**: Where rock excavation is to be measured for payment, quantities will be as determined by the City. Rock excavation will be measured by the cubic yard. For pay purposes, dimensions shall be computed as the difference in elevation between the top and bottom of the rock (as determined by the City) multiplied by the specified trench width for the pipe size being laid. Where rock is encountered in the bottom of the trench, the maximum depth for payment purposes shall be 6 inches below the bottom of the pipe. Rock excavation shall consist of the removal and satisfactory disposal of all materials, which in the opinion of the City Engineer, cannot be excavated except by a track-mounted power excavator, equivalent to a Caterpillar Model No. 325 or equivalent equipped with new rock teeth. Practical excavation is defined as the ability to remove at least 30 cubic yards during one hour of continuous digging. Trenches in excess of 10 feet in width and pits in excess of 30 feet in either length or width are classified as open excavation.

**Payment**: Rock excavation will be paid for at the contract unit price per cubic yard for rock excavation and shall include all labor, materials, insurance, mats, signage, traffic control, tools, equipment and incidentals necessary to excavate and dispose of rock off site, backfilling the excavated trench to the bottom of the pipe with select backfill material, and shall include the cost of removing all excavated materials which are not suitable for backfill. No payment will be made for rock that has been excavated subsequent to ripping operations.

#### K. Sheeting and Bracing (Piling)

**Measurement and Payment**: Payment for sheeting and bracing, except when ordered to be left in place, and all other work incidental to sheeting and bracing, shall not be made separately unless specified or as shown on the plans or as directed by the City Engineer, but shall be included in the bid price for other items.

When specified, payment for "Steel Sheet Piling" shall be made at the contract unit price bid per linear foot (horizontal).

When specified, payment for "Steel Sheet Piling Left in Place" shall be made at the contract unit price bid per linear foot.

#### L. Select Fill:

**Measurement**: Trench excavation determined to be unusable by the City Engineer, or his representative, resulting from material which may be unsatisfactory (as defined in paragraph 2.1.1F of *Section 02275, Trenching, Backfilling, and Compaction of Utilities*), non-compactable, naturally wet (when removed from trench) and otherwise unusable due to too high a moisture content for compaction (as opposed to unprotected soil exposed carelessly to rain which becomes unusable in which case there is no claim for payment for trench borrow). Measurement shall be made along the centerline of the pipe and the pay quantity shall be determined based upon the depth of fill placed times the maximum trench width (pipe outside diameter plus 2 feet). Selected granular backfill in excess of the maximum quantity, as specified, shall be furnished and placed by the Contractor.

**Payment**: Select Fill will be paid for at the contract unit price by the compacted cubic yard, in place, and shall include all material, equipment, and labor to furnish, haul, placement, compact the approved material, and haul off unsuitable material, complete in place, in the locations as designated on the drawings or as approved by the City Engineer.

M. **Other:** Other items shall be paid for as stated in the Proposal.

### 1.2 WATER

Measurements for purpose of payment shall be in accordance with the unit quantities stated in the proposal as defined below. Whenever units of measure, (i.e. linear feet, each, and similar units of measurement) are mentioned in a proposal, it shall be interpreted to mean the unit installed in accordance with the plans and specifications, and ready for use. Prices for the following bid items shall include all labor, materials.

tools, equipment, and other incidentals necessary to complete the work as shown on the plans and in accordance with these specifications.

#### A. Bedding Stone for Water Pipe:

**Measurement**: When called for in the proposal or on the plans or when directed by the City Engineer or Water Resources Manager, aggregate material used for bedding water lines will be measured by the cubic yard of pipe bedding material placed.

**Payment**: Pipe bedding stone will be paid for at the contract unit price per cubic yard for pipe bedding material, complete and in place.

#### B. Blow-Offs:

**Measurement**: Blow-offs will be measured on a per each basis for the number of blow-offs installed.

**Payment**: Blow-offs will be paid for at the contract unit price per blow-off for the size specified, and all materials incidental to the installation of the blow-off, complete in place. This price shall include, but is not necessarily limited to, Kupferles's blow off service, piping, tapped MJ plug, joint restraint system, fittings, valve box(es), bedding material, concrete collar, blocking, and other related incidentals as shown on **Standard Detail 514.01**.

#### C. Concrete Encasement

**Measurement**: Payment for furnishing concrete encasement will be at the unit price bid per cubic yard for the class of concrete stated in the proposal.

**Payment**: The unit priced stated in the proposal shall include the cost of additional depth of excavation, forming, the furnishing and placing of concrete, cofferdams, laying of pipe line to grade but excluding the cost of the pipe itself, complete in place, including all labor, equipment, and material, necessary and all other work incidental to the complete installation of the concrete encasement in accordance with the specification and details shown on the plans. Payment will be made to neat lines of construction shown on the plans with no allowance being made for extra ditch width.

#### D. Concrete Piers:

**Measurement:** Reinforced concrete piers shall be measured on an each basis based on the height and the structural details shown on the contract drawings.

**Payment**: This item will be paid for at the contract unit price bid for concrete piers complete in place, including all labor, equipment, and material, necessary for furnishing, excavating, disposal of excess material, stone bedding, reinforcement, anchor bolts, steel straps, concrete, testing, forming, concrete finishing, backfilling, restoration of grade, and all other work incidental to the complete installation of the concrete piers in accordance with the specification and details shown on the plans. Payment will be made to neat lines of construction shown on the plans with no allowance being made for extra ditch width.

### E. Connecting to Existing Mains

**Not a pay item.** Fittings and specialty items used in making the connections will be measured and paid for at the unit price bid by the Contractor for "Fittings" and at the unit price bid for "Tapping Sleeves and Valve."

#### F. Dechlorination

**Not a pay item.** The associated work, materials, and labor involved in dechlorinating water is incidental to the cost of the water main construction and shall be included in other bid items.

#### G. Ductile Iron Pipe (For Mains):

**Measurement**: 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 (i.e. fittings and valves) and shall be made through casings. 6-inch hydrant leg lead-in pipe is not included but is considered incidental to the cost of hydrant installation.

**Payment**: The accepted quantities of water line pipe will be paid for at the contract unit price per linear foot of the various types, depths, and size pipe specified (fittings, valves, and specialty items are paid separately), complete in place. This price shall include labor, equipment, materials, trench excavation (excluding select fill and rock as defined in item 1.1 J, of this document), shoring, or use of trench box, installation, concrete thrust blocking, making connections to existing mains, installing in existing casing, pumping, backfilling, compaction, testing of failed trenches, disposal of excess material, pressure testing, chlorinating, dechlorination, bacteriological testing, 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.

#### H. Ductile Iron Pipe, Bored and Jacked

**Measurement**: Measurement of Ductile Iron Pipe, bored and jacked, shall be measured by the linear feet of pipe installed. Bored and jacked Ductile Iron Pipe shall include any excavation, any backfill, bore, jacking, the pipe, dewatering, clean up, restoration and any other work required for a complete and acceptable in place installation.

**Payment**: Ductile Iron Pipe, bored and jacked will be paid for at the contract unit price per linear foot for pipe bored, complete, and acceptable in place. The price shall be full compensations for pipe, labor, equipment, 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. Payment will only be made upon acceptance by the City of Wilson and the Consulting Engineer that the bore is installed to the proper elevation and grade. Any deviations, errors, or unacceptable conditions noted by the City of Wilson or the Wilson County office of the North Carolina Department of Transportation (if applicable) will be the responsibility of the Contractor to correct to the full satisfaction of the above mentioned parties without additional compensation.

#### I. Encasement Pipe (bored):

**Measurement**: Steel casing pipe of the wall thickness and diameter specified will be measured by the linear feet of steel casing pipe installed.

Encasement of water lines by the dry bore and jacking method shall include any excavation, any backfill, the encasement pipe, bore, jacking, spiders, the end seals, dewatering, clean up, restoration and any other work required for a complete and acceptable in place installation.

**Payment**: Steel casing pipe will be paid for at the contract unit price per linear foot per diameter per thickness for steel casing pipe bored, complete, and acceptable in place. Payment will only be made upon acceptance by the City of Wilson and the Consulting Engineer that the bore is installed to the proper elevation and grade and ready for the installation of the designed carrier pipe without any additional compensation. Any deviations, errors, or unacceptable conditions noted by the City of Wilson or the Wilson County office of the North Carolina Department of Transportation (if applicable) will be the responsibility of the Contractor to correct to the full satisfaction of the above-mentioned parties. Lines either off on grade or alignment shall be rejected or corrected in a manner approved by the City's Engineer or Water Resources Manager. *Regardless of the number of withdrawal and reattempts, the bore shall be paid one time for a successful bore on a linear foot basis.* The cost of the carrier pipe is not to be included.

#### J. Encasement Pipe (open cut):

**Measurement**: Steel casing pipe of the wall thickness and diameter specified will be measured by the linear feet of steel casing pipe installed.

Encasement of water lines by the open cut method shall include any excavation, any backfill, the encasement pipe, spiders, the ends seals, dewatering, clean up, restoration and any other work required for a complete in place installation.

**Payment**: Steel casing pipe will be paid for at the contract unit price per linear foot per diameter per thickness for steel casing pipe installed by the pipe open cut, complete and in place. Lines either off on grade or alignment shall be rejected or corrected in a manner approved by the City's Engineer or Water Resources Manager. The cost of the carrier pipe is not to be included.

#### K. Excavation and Backfill:

**Measurement and payment**: All excavation and backfill for water mains shall be included in the cost of the other items bid – this is not a pay item.

#### L. Fittings and Accessories:

**Measurement**: Fittings and specialty items used in conjunction with ductile iron or C900 PVC pipe will be measured per each.

**Payment**: Payment for ductile iron fittings shall include all labor, equipment and all materials necessary for installing, making connections to existing mains, tie rods, wedge action restrainer glands, backfilling, testing, sterilizing, and all other work

incidental to the complete installation of these fittings in accordance with the specifications.

#### M. Fire Hydrants:

**Measurement**: Fire hydrants will be measured by the number of hydrants installed on an each basis.

**Payment**: Price shall include all labor, equipment, and all materials (including extensions and fittings), necessary to install the hydrant including construction staking, #57 stone, drainage pit, thrust restraint, 6-inch hydrant leg lead in pipe, testing and disinfecting, complete and in place. Valves will be paid for separately. 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. Pavement repair, select fill, and stone for trench stabilization are not to be included in the bid price for the fire hydrant.

#### N. Fire Hydrants Removal:

**Measurement**: Fire hydrants will be measured by the number of existing fire hydrants removed on an each basis.

**Payment**: Price shall include all labor, equipment, and all materials necessary to remove the hydrant including excavation, backfilling, topsoil, seeding or sod replacement, capping the hydrant lateral, curb/gutter and sidewalk replacement, and delivery of old hydrant to the Public Services Department (the hydrant shall remain the property of the City). Pavement repair, select fill, and stone for trench stabilization are not to be included in the bid price for the fire hydrant removal.

### O. Fire Vaults and Large Meter Vaults:

**Measurement**: Vaults for backflow prevention devices, detector check, RPZ, or large meters (meters larger than 2 inches) shall be paid lump sum. Cost for vault is to include all labor, materials, equipment, backfill, compaction, etc. complete and in place. The cost of the vault is to also include the insulated enclosure (below ground vaults are not permitted) and concrete pad, stone bedding, the backflow prevention device and/or meter, gate valves, post indicator valves (if applicable), fittings, check valves, couplings, sleeves, fire department connection (if applicable), hatch, floor drain (if applicable) and drain line, pipe stands, vents, ladder, painting of pipe and fittings (if applicable), defect repair, testing, etc. necessary to render a complete unit as shown on the contract drawings.

Payment: Vault payment will be paid as lump sum.

### P. Foundation Stone:

**Measurement**: Foundation stone used in stabilizing the bottom of trenches will be field measured in the trench by the cubic yard, complete in place.

**Payment**: When the City Engineer directs the use of foundation stone, foundation stone shall be paid for at the contract unit price for foundation stone by the cubic

yard. Payment shall include all materials and labor incidental to the placing of the stone and any additional extra depth of trench or excavation necessary to accommodate the stone including disposal of unusable material necessary to allow for placement of the foundation stone.

### Q. Miscellaneous Fittings

Measurement: By the piece.

**Payment**: Payment for ductile iron fittings where specified on the plans shall be made per piece Cost of accessories shall be included in the price of the fitting.

### R. PVC Pipe (when applicable):

**Measurement**: 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 (i.e. fittings and valves) and shall be made through casings. 6-inch hydrant leg lead-in pipe is not included but is considered incidental to the cost of hydrant installation.

**Payment**: The accepted quantities of PVC water line pipe will be paid for at the contract unit price per linear foot of the various types, depths, and size pipe specified (fittings, valves, and specialty items are paid separately), complete in place. This price shall include all labor, equipment, materials, trench excavation (excluding rock and select fill), shoring, or use of trench box, installation, concrete thrust blocking, marking tape, copper wire with valve boxes, making connections to existing mains, installing in existing casing, pumping, backfilling, compaction, testing of failed trenches, disposal of excess material, pressure testing, chlorinating, dechlorination, and bacteriological testing and all other work incidental to the complete installation of the mains in accordance with these specifications. No special payment will be made for fittings, specialty items, or pipe used in making connections to existing mains where such connections are noted on the plans.

### S. Removal and Disposal of Asbestos Cement Pipe

**Measurement**: When the amount of pipe to be removed is less than 12 feet, the Contractor shall be paid a lump sum per each event. When the amount removed exceeds 12 feet, the Contractor shall be paid the lump sum plus the bid price per linear foot for pipe removed in excess of 12 feet.

**Payment**: Asbestos Cement Pipe removal will be paid for at the contract unit price per lump sum and/or by the foot as bid and shall include all labor, materials, and equipment to excavate, remove and properly dispose of pipe. Contractor shall provide documentation to the City as to the legal disposition of the pipe in accordance with the Solid Waste Disposal Act, as amended from time to time.

### T. Tapping Sleeve and Valve:

**Measurement**: Tapping sleeve and valve will be measured by the number of each size installed.

**Payment**: Tapping sleeve and valve price shall include furnishing all materials, equipment, and labor to make a wet tap on an existing line, complete in place, to

include valve, valve box, stainless steel tapping tee sleeve, tap, tapping machine, anchor blocks, excavations, backfill, disinfection, and testing of sleeve. Wet taps will be paid for at the contract unit price per tap for the size specified, complete in place.

### U. Testing and Sterilizing

**Not a pay item.** The associated work, materials, and labor involved in testing and sterilizing water mains is incidental to the cost of the water main construction and shall be included in other bid items.

### V. Tie Rods, Restraint Flange, Retainer Glands and Retainer Clamps:

**Measurement**: Tie rods, wedge action restrainer glands, retainer glands, and retainer clamps are considered incidental to the cost of construction.

Payment: Not a pay item.

### W. Thrust Restraints

**Not a pay item**. Concrete blocking shall be installed as required for all tees, bends etc. per the applicable standard details. No separate payment shall be made for thrust restraints. The cost of thrust restraints is considered incidental to the cost of the contract unit price bid for each applicable fitting bid.

### X. Tunneling:

Measurement: Tunneling will be measured by the linear feet of tunnel installed.

The tunneling method shall include any and all excavation, shoring and bracing, any backfill, steel liner plates and bolts, ventilation system for workers, lagging, spiders, grout plugs, sand-cement grouting of voids, steel drain pipe, french drain, concrete paved invert, the ends seals, dewatering, clean up, restoration and any other work required for a complete in place installation.

**Payment**: Tunneling will be paid for at the contract unit price per linear foot for diameter installed by the tunneling cut, complete and in place. Payment will only be made upon acceptance by the City of Wilson and the Consulting Engineer that the tunnel is installed to the proper elevation and grade and ready for the installation of the designed carrier pipe without any additional compensation. Any deviations, errors, or unacceptable conditions noted by the City of Wilson or the Johnston County office of the North Carolina Department of Transportation (if applicable) will be the responsibility of the Contractor to correct to the full satisfaction of the abovementioned parties. Unit price does not include the carrier pipe.

### Y. Valves – Air Release Valve & Manhole:

**Measurement**: Air/Vacuum Release valves will be measured on a per each basis for the number of units installed.

**Payment**: Air release valves will be paid for at the contract unit price per air release valve and manhole for the size specified, and all materials incidental to the

installation of the air release valve and manhole, complete in place. This price shall include, but is not necessarily limited to, bedding stone, the direct tap and/or saddle, brass plumbing valves, brass street ells and screen, including the doghouse manhole, concrete grade rings (if applicable), and frame and cover, grade adjustments to iron frame if necessary and other incidentals as shown on **Standard Detail 516.01**.

#### Z. Valve with Box:

**Measurement**: Gate valves and inserting valves will be measured by the number of each size and type of valve installed.

**Payment**: Gate valves and inserting valves will be paid for at the contract unit price, complete in place, per valve for the type and size specified, complete in place. This price shall include all labor, equipment, and materials necessary for installing, valve footing (if applicable), furnishing, backfilling, testing, slot cut in valve box for tracer wire, copper wire with valve box, sterilizing and all other work incidental to the complete installation of the valves, with necessary valve box, in accordance with the specifications. Cost for any accessory kit to be included in price of valve.

AA. Valve Box Removal:

**Measurement**: Valve box removal will be measured by the number of each valve box removed.

**Payment**: Payment for valve box removal shall be made at the contract unit price for each valve box removed and delivered to the Water Resources Department. Valve box removal shall include removal, placement of select fill material, compaction, and pavement repair. This price shall include all labor, equipment, materials necessary for removal of valve boxes and all other work incidental to the complete removal of the valve boxes in accordance with the specifications.

#### BB. Small Water Services (2" or less), Copper Tubing (Pipe) – by open cut:

**Measurement**: Measurement of water services shall be made on a per service basis regardless of service pipe material or length.

**Payment**: The water service pipe shall be paid for at the contract unit bid per service of the size indicated on the drawings, complete and in place, at a minimum depth of 24 inches. The price shall include all equipment, labor, and materials for installation, making tap, furnishing and running service line, setting meter box and setter as applicable, tail piece extension and marker post if applicable, testing and disinfection complete in place in accordance with **Standard Details 515.01**, **515.02** and **519.02**, as applicable, curb/gutter and sidewalk replacement if necessary. The City will furnish and set meter.

# CC. Small Water Services (2" or less), Copper Tubing (Pipe) – by Jacking or Boring:

**Measurement**: Measurement of jacked water services shall be made on a per service basis regardless of service pipe material or length.

**Payment**: The jacked service shall be paid for at the contract unit bid price per service of the size indicated on the drawings, complete and in place. The price shall include all equipment, labor, and materials for installation, making tap, running or punching service line, setting meter box and setter as applicable, testing and disinfection complete in place in accordance with **Standard Details 515.01**, **515.02** and **519.02**. The City will furnish and set meter.

#### DD. Water Service Line Replacement:

Measurement: Water service line replacement shall be measured on an each basis.

**Payment**: Water service line replacement shall include all materials, labor, and equipment for installation, furnishing pipe, running service line, removal and reconnection of service, testing, disinfection, sidewalk (if necessary) and curb removal and replacement, complete in place. Payment for pavement removal and replacement is paid under *Pavement Removal and Replacement*.

#### EE. Other: Other items shall be paid for as stated in the Proposal.

#### 1.3 SEWER

Measurements for purpose of payment shall be in accordance with the unit quantities stated in the proposal as defined below. Prices for the following bid items shall include all labor, materials, tools, equipment, and other incidentals necessary to complete the work as shown on the plans and in accordance with these specifications.

#### A. Bedding Stone, Granular:

**Measurement**: Stone for pipe bedding shall be measured by the ton in place in the trench, as ordered by the City Engineer. Stone tickets are required to be turned in to a City representative at the end of the day.

**Payment**: Price per ton for granular bedding stone shall include all materials, equipment, and labor required to furnish and place stone in the trench locations designated by the City Engineer.

#### B. Building Connections/Service Laterals:

**Measurement:** Measurement of building connections/service lateral shall be made on a per service basis, regardless of service pipe material, as required to comply with **Standard Detail 733.01**. A standard service shall be defined as the length of pipe and fittings, with associated materials, labor, and equipment, including the CO box, required to run from the centerline of the main to the CO box placed 3 feet behind the back of curb or, where no curb and gutter exists, the edge of pavement; all in accordance with **Standard Detail 733.01**.

**Measurement of Building Connections/Service Lateral Extensions**: When ordered by the City Engineer to lengthen or extend the service beyond that the standard CO box location shown on **Standard Detail 733.01**, building

connections/service lateral extensions shall be measured along the center line of the pipe beginning 3 feet from the back of the curb or edge of pavement where no curb and gutter exists, and ending at the centerline of the extended cleanout location.

**Payment:** Payment for service laterals shall be at the contract unit price bid, per service, for the sized indicated and shall include bedding, bends, wyes, saddles (if applicable), adapters, long sweep wyes, cleanout riser and plugs, cleanout box, brick, stone, and other incidentals as necessary, curb/gutter and sidewalk replacement (if necessary) complete in place as shown on **Standard Detail 733.01**. Any temporary pumps required to by-pass sewer around work areas shall be provided at no additional cost.

**Payment for Building Connections/Service Lateral Extensions**: Building connections/service lateral extensions shall be paid by the linear foot along the center line of the pipe and shall only include the extra length of pipe, excavation, bedding stone, and fittings, if applicable.

#### C. Bypass Pumping:

**Measurement**: Bypass pumping is considered incidental to the cost of the pipe unless otherwise shown in the proposal.

Payment: Not a pay item.

#### D. Carrier Pipes (Installed in either Steel Encasements or Tunnel Liners)

Measurement: Measurement shall be along the centerline of the pipe.

**Payment**: Payment for carrier pipes will be made at the contract unit price bid per linear foot and shall include all necessary materials, tools, and equipment necessary to install the pipe. The unit price does not include the casing pipe (see the individual pay items *Encasement Pipe* and *Tunneling*). The unit price shall include the cost of excavation, bedding, backfilling, cleanup, and testing.

#### E. Combination Sewer Force Main Air Valve and Air Release Manhole

**Measurement**: Measurement for combination air valve and air release manholes on force mains shall be on an each basis.

**Payment**: Payment for combination air valve and air release manholes shall be paid for at the contract unit price bid for combination air valve and air release manholes. The price shall include all labor, material, equipment, stone bedding, precast doghouse manhole, cast iron frame and cover, bedding, tap and saddle, valve, concrete grade rings (if applicable), grade adjustments to iron frame if necessary, and other incidentals and piping as necessary, complete in place as shown on **Standard Detail 734.01**.

#### F. Concrete Encasement

**Measurement**: Payment for furnishing concrete encasement will be at the unit price bid per cubic yard for the class of concrete stated in the proposal, such price to be paid in addition to that paid per foot of sewer main.

**Payment**: The unit prices stated in the proposal shall include the cost of additional depth of excavation, forming, the furnishing and placing of concrete, cofferdams, and laying of pipe line to grade but excluding the pipe itself, complete in place, including all labor, equipment, and material, necessary and all other work incidental to the complete installation of the concrete encasement in accordance with the specification and details shown on the plans. Payment will be made to neat lines of construction shown on the plans with no allowance being made for extra ditch width.

### G. Concrete – Miscellaneous Unformed:

**Measurement**: Concrete, except that used in manholes, will be measured in cubic yards of unformed concrete actually placed. Typical uses include concrete collars (slope anchors), cradles, and all other miscellaneous concrete related to sewer line installation.

**Payment**: This item will be paid for at the contract unit price per cubic yard for unformed concrete for collars, cradles, and all other miscellaneous concrete related to sewer line installation, in place, including all material, equipment, and labor, to place the concrete in the locations shown on the construction drawings and/or as directed by the City Engineer or Water Resources Manager including the cost of removing and disposing of the material replaced by the concrete. Payment will be made only for the quantities and dimensions (made to neat lines of construction) as shown on drawings or applicable details. Price does not include pipe.

### H. Concrete Piers

**Measurement**: Reinforced concrete piers shall be measured on an each basis based on the height and the structural details shown on the contract drawings.

**Payment**: This item will be paid for at the contract unit price bid for concrete piers complete in place, including all labor, equipment, and material, necessary for furnishing, excavating, disposal of excess material, stone bedding, reinforcement, anchor bolts, steel straps, concrete, testing, forming, concrete finishing, backfilling, restoration of grade, and all other work incidental to the complete installation of the concrete piers in accordance with the specification and details shown on the plans. Payment will be made to neat lines of construction shown on the plans with no allowance being made for extra ditch width.

### I. Connections to Other Sewers or to Appurtenances

**Measurement**: Measurement shall be made on an each basis for connections made to other sanitary sewers and appurtenances.

**Payment**: Connections to other sewers or appurtenances shall be made on a lump sum basis and shall be full compensation for removing, repairing, and/or replacing pipe and/or structures and shall be full compensation for the completed work in place including all materials, labor, tools, and equipment.

#### J. Ductile Iron Sewer Line

Measurement: See pay item Measurement of Sewer Pipe.

Payment: See pay item Measurement of Sewer Pipe.

#### K. Encasement Pipe (bored):

**Measurement**: Steel casing pipe of the wall thickness and diameter specified will be measured by the linear feet of steel casing pipe installed.

Encasement of sewer mains by the dry bore and jacking method shall include any excavation, any backfill, the encasement pipe, bore, jacking, spiders, end seals, dewatering, clean up, restoration and any other work required for a complete in place installation.

**Payment**: Steel casing pipe will be paid for at the contract unit price bid per linear foot per diameter per thickness for steel casing pipe bored, complete and acceptable in place. Payment will only be made upon acceptance by the City of Wilson and the Consulting Engineer that the bore is installed to the proper elevation and grade and ready for the installation of the designed carrier pipe without any additional compensation. Any deviations, errors, or unacceptable conditions noted by the City of Wilson or the Wilson County office of the North Carolina Department of Transportation (if applicable) will be the responsibility of the Contractor to correct to the satisfaction of the above-mentioned parties. Lines either off on grade or alignment shall be rejected or corrected in a manner approved by the City Engineer or Water Resources Manager. *Regardless of the number of withdrawal and reattempts, the bore shall be paid one time for a successful bore on a linear foot basis.* The cost of the carrier pipe is not to be included.

#### L. Encasement Pipe (open cut):

**Measurement**: Steel casing pipe of the wall thickness and diameter specified will be measured by the linear feet of steel casing pipe installed.

Encasement of sewer mains by the open cut method shall include any excavation, any backfill, the encasement pipe, spiders, the ends seals, dewatering, clean up, restoration and any other work required for a complete in place installation.

**Payment**: Steel casing pipe will be paid for at the contract unit price bid per linear foot per diameter per thickness for steel casing pipe installed by the pipe open cut, complete and in place. Lines off either on grade or alignment shall be rejected and corrected in a manner approved by the City Engineer or Water Resources Manager. The cost of the carrier pipe is not to be included.

### M. Excavation and Backfill:

**Measurement and Payment**: All excavation and backfill shall be included in the cost of the other items bid – not a pay item.

When the removal of existing structures or materials is classified separately as a contract pay item, payment will be made in accordance with the contract price; otherwise, such work will be considered as incidental work and will not be paid for directly, but the cost shall be included in the unit price for other items of work. In either case, such price or prices shall be full compensation for all labor, materials, tools, equipment, and incidentals necessary to complete the work.

#### N. Manholes – Standard and Drop:

**Measurement:** Manholes shall be measured on an each basis for a basic 6-foot deep manhole inclusive of frame and cover and base. For all depths in excess of 6 feet, manholes shall be measured by the vertical foot of depth of the manhole constructed in 2-foot increments (e.g. 0 to 6', 6.1' to 8.0', 8.1' to 10.0', etc.). For determining the additional depth of manhole to be paid for at the unit price bid per vertical foot, manholes shall be measured from the invert of the pipe outlet to the top of the manhole frame and cover and recorded to the nearest 1/10 of a foot.

Where more than one type or size (diameter) designation is shown on the drawings, or called for in the special provisions, a separate bid item of the following form shall cover each:

- 1) Type (or Size) Manhole, per each.
- 2) Depth of Manhole, per vertical foot.
- 3) Drop Manhole Connection, per vertical foot.

**Payment**: Manholes shall be paid for at the contract unit price bid for a 6-foot deep manhole on an each basis plus a unit price per vertical foot for all depths in excess of 6 feet deep in 2-foot increments (e.g. 0 to 6', 6.1' to 8.0', 8.1' to 10.0', etc.). Price shall include furnishing and constructing manholes complete-in-place including excavation, connection to existing sewers if necessary (including inside drops where they occur), complete invert forming in accordance with the standards and drawings, rubber boots, bedding stone, furnishing and bolting castings to cone, gaskets, parging interior joints, vent pipe if required (see **Standard Detail 732.10**), grade adjustment and grade rings if applicable (see **Standard Detail 732.11**), exterior sealing system (**Standard Detail 732.11**), vacuum testing, backfill and compaction complete in every detail. See **Standard Details 732.01**, **732.03**, **732.04**, and **732.05**.

#### O. Manholes – Doghouse:

**Measurement:** Manholes shall be measured on an each basis for a basic manhole inclusive of frame and cover and a base constructed in accordance with **Standard Detail 732.02**. For all depths in excess of 6 feet, manholes shall be measured by the vertical foot of depth of the manhole constructed in 2-foot increments (e.g. 0 to 6', 6.1' to 8.0', 8.1' to 10.0', etc.). For determining the additional depth of manhole to be paid for at the unit price bid per vertical foot, manholes shall be measured from the invert of the pipe outlet to the top of the manhole frame and cover and recorded to the nearest 1/10 of a foot.

Where more than one type or diameter designation is shown on the drawings, or called for in the special provisions, a separate bid item of the following form shall cover each:

- 1) Type (or Diameter) Manhole, per each.
- 2) Depth of Manhole, per vertical foot.
- 3) Drop Manhole Connection, per vertical foot.

**Payment**: Doghouse manholes shall be paid for at the contract unit price bid for a 6 foot deep manhole on an each basis plus a unit price per vertical foot for all depths in excess of 6 feet deep, in 2-foot increments (e.g. 0 to 6', 6.1' to 8.0', 8.1' to 10.0', etc.). Price shall include furnishing and constructing manholes complete-in-place including excavation, base construction, complete invert forming in accordance with the standards and drawings, rubber boots if applicable, bedding stone, inside drops where they occur, furnishing and bolting castings to cone if applicable, gaskets, parging interior joints, vent pipe if required (see Standard Detail 732.10), grade adjustment and grade rings, if applicable (see Standard Detail C06.03), flex-seal sealant at grade ring adjustments (see Standard Detail 732.11), exterior sealing system (see Standard Detail 732.11), vacuum testing, backfill and compaction complete in every detail. See Standard Detail 732.02.

### P. Manhole Frames and Covers – Standard and Watertight:

**Measurement and Payment**: Not a pay item. The cost, setting, and final adjustment of the standard and watertight manhole frames and covers are covered under the cost of the manhole for the type manhole specified. See **Standard Details C06.01** and **735.01**.

### Q. Manhole - Precast Concrete Riser Ring:

**Measurement and Payment**: Not a pay item. The cost, setting, and final adjustment of manhole grade rings are covered under the cost of the manhole for the type of manhole specified. See **Standard Detail C06.03**.

### R. Measurement of Sewer Pipe

**Measurement:** Sewer pipe shall be measured from center to center of manholes and depth of cut from invert to original ground line at centerline. No deductions in length will be made for branches and appurtenances along the line. For all depths in excess of 6 feet, sewer pipe shall be measured by the vertical foot of depth of the line constructed in 2-foot increments (e.g. 0 to 6', 6.1' to 8.0', 8.1' to 10.0', etc.). The Contractor must determine the original ground line immediately prior to any trench excavation. It is the Contractor's responsibility to provide this information to the City within 24 hours of the beginning of the trench excavation activities.

**Payment:** Sewer pipe shall be paid for at the contract unit price bid for a 6 foot deep line on a per linear foot basis plus a unit price per vertical foot for all depths in excess of 6 feet deep, in 2-foot increments (e.g. 0 to 6', 6.1' to 8.0', 8.1' to 10.0', etc.). Payment will be made at the contract unit price bid per linear foot as stated in the proposal for the type of pipe specified and shall include trench excavation (excluding rock and select fill), shoring or use of trench box, installation, pumping,

backfilling, compaction, testing of failed trenches, disposal of excess material, pressure testing, and cleanup complete in place.

#### S. PVC Sewer Line

Measurement: See pay item Measurement of Sewer Pipe.

Payment: See pay item Measurement of Sewer Pipe.

T. Pump Stations

**Measurement:** Sanitary sewer lift stations shall be measured based on an each basis.

**Payment:** Sanitary sewer lift stations shall be paid for at the contract lump sum price bid based on the contract drawings. Payment shall cover complete installation including, but not necessarily limited to, auxiliary generator or Dri-Prime backup pump as applicable, emergency backup pump valved connection, valve vault, fencing and gates, odor control/water tank pad, wetwell and valve vault, pumps, non-freeze yard hydrant, graveled fenced enclosure, access road, shower and eye wash station, water service and meter, electrical service, disconnect, and meter, area light, control panel, manufacturers start up, witness and operational test, operational manuals, etc. complete in place.

#### U. Testing:

**Not a pay item.** The associated work, materials and labor involved in testing sewer mains and manholes is considered incidental to the cost of the sewer main construction and shall be included in other bid items.

### V. Tunneling:

Measurement: Tunneling will be measured by the linear feet of tunnel installed.

The tunneling method shall include any and all excavation including disposal of excavated material, shoring and bracing, any backfill, steel liner plates and bolts, ventilation system for workers, lagging, spiders, grout plugs, sand-cement grouting of voids, steel drain pipe, french drain, concrete paved invert, the ends seals, dewatering, clean up, restoration and any other work required for a complete in place installation.

**Payment**: Tunneling will be paid for at the contract unit price per linear foot for diameter installed by the tunneling cut, complete and acceptable in place. Payment will only be made upon acceptance by the City of Wilson and the Consulting Engineer that the tunnel is installed to the proper elevation and grade and ready for the installation of the designed carrier pipe without any additional compensation. Any deviations, errors, or unacceptable conditions noted by the City of Wilson or the Nashville office of the North Carolina Department of Transportation (if applicable) will be the responsibility of the Contractor to correct to the satisfaction of the above-mentioned parties. Unit price does not include the carrier pipe.

W. Other: Other items shall be paid for as stated in the Proposal.

## 1.4 STORM DRAINAGE

#### A. Catch Basins and Drop Inlets (Precast or Block):

**Measurement**: Precast or block catch basins and drop inlets will be measured on an each basis for the specified size and depth shown on the plans.

**Payment**: Precast or block catch basins and drop inlets will be paid for at the contract unit price per each for the specified size and depth shown on the plans. Price shall include all labor, material, and equipment necessary for installation, backfill, pouring of concrete invert, cutting or sawing, concrete collars, stone, invert forming, iron castings, and mortaring of required components, etc., complete in place, and in accordance with the requirements of paragraphs 3.3 and 3.4 of Section 02630, *Storm Drainage*.

## B. Flared End Section:

Measurement: Flared end section, will be measured on an each basis.

**Payment**: Flared end section will be paid for at the contract unit price per each of the size indicated on the drawings and shall include all equipment, labor, materials for installation, excavation, backfill, stone if required, sealing and mortaring, complete in place.

#### C. Head/Endwalls:

Measurement: Head/endwalls will be measured on an each basis.

**Payment**: Head/endwalls will be paid for at the contract unit price per each of the size and type indicated on the drawings and shall include all equipment, labor, materials for installation, excavation, weep holes, shoring removal and replacement, curing, finishing, backfill, sealing and mortaring, complete in place.

#### D. Manholes - Standard:

**Measurement:** Storm drainage manholes shall be measured on an each basis for the specified diameter and depth shown on the plans.

**Payment**: Standard manholes will be paid for at the contract unit price for the specified diameter and depth shown on the plans, complete in place. Price shall include excavation, bedding stone, complete invert pouring and forming of concrete in accordance with the standard details and drawings, iron castings, concrete grade rings (if required), gaskets, backfill, and compaction, etc.

# E. Manhole Frames and Covers – Standard:

**Measurement**: Manhole frames and covers are considered incidental to the cost of the precast structure on which it will be placed.

Payment: Not a pay item.

## F. Manhole, Abandonment:

Measurement: Manhole abandonment will be measured on an each basis.

**Payment**: Manhole abandonment will be paid for at the contract unit price per each, complete in place, in accordance with the requirements paragraph 3.4 of *Section* 02530, *Sanitary Sewer*.

G. Rip Rap, Dry:

**Measurement**: Dry rip rap will be measured by the ton.

**Payment**: Dry rip rap will be paid for at the contract unit price per ton for the size indicated on the drawings and shall include all materials (including Geotextile fabric), labor, and equipment necessary for a complete in place installation.

#### H. Rip Rap, Grouted:

Measurement: Grouted rip rap will be measured by the ton.

**Payment**: Grouted rip rap will be paid for at the contract unit price per ton for the size indicated on the drawings, with the top 6 inches grouted, and shall include all materials (including geo-textile fabric), labor, and equipment necessary for a complete in place installation.

## I. Storm Pipe; Reinforced Concrete, Corrugated Aluminum, & HDPE:

**Measurement**: Storm pipe will be measured from the exact beginning of the pipe to the end of the pipe for the size and class pipe specified.

**Payment**: Storm pipe will be paid for at the contract unit price per linear foot for pipe of the wall thickness, class, and pipe size specified, complete in place. This price shall include pipe, trench excavation (excluding rock), stone bedding if specified, shoring or use of trench box, installation, pumping, joint compound, backfilling (excluding select fill), compaction, and disposal of excess material.

J. Other: Other items shall be paid for as stated in the Proposal.

# 1.5 EARTHWORK

#### A. Geotextile Stabilization Fabric

**Measurement**: Geotextile stabilization fabric will be measured in square yards based on surface measurements of material installed. Material waste will not be included in the measurement.

**Payment**: Geotextile stabilization fabric will be paid for at the contract unit price bid in square yards for the type of material specified on the plans or by the City Engineer and shall include all labor, equipment, materials, lapping, seaming if applicable, waste disposal, etc. necessary for a complete in place installation.

#### B. Offsite Borrow:

**Measurement**: Off-site borrow will be measured in its original position by cross sectioning the area excavated for borrow. The number of cubic yards will be computed from cross section measurements by the average end method. When it is impractical to measure the borrow, and if approved by the City Engineer, truck tally measurements will be made in accordance with paragraph A of Section 3.11 – *Method of Volume Measurement*, Division 02200 - *Earthwork*.

**Payment**: Off-site borrow will be paid at the contract unit price per cubic yard for material placed, compacted, and complete in place, including all excavation, loading, hauling, erosion control of borrow source, placement, spreading and compaction of borrow material.

C. Onsite Borrow: Material obtained from the site by cut and fill areas or other areas onsite that are designated to be used as borrow material is not a pay item for material but payment will be made by regular excavation.

## D. Unclassified (Regular) Excavation:

**Measurement**: Unclassified regular excavation will be measured in its original position by cross sectioning the excavation area. The number of cubic yards will be computed from cross section measurements by the average end method. When it is impractical to measure by cross-section method, other acceptable methods, involving 3-dimensional measurements may be used if approved by the City Engineer.

In cut sections, excavation of topsoil and root mat and material down to subgrade elevation or to a point of 1 foot below the top of existing natural grade or to the depth specified on the plans, which ever is greater, will be measured as regular excavation. When areas of unsuitable material are shown on the plans, excavation 1 foot below the elevation of such material shown on the plans will be measured as regular excavation.

In fill sections, excavation of topsoil and root mat and material down to subgrade elevation or to an elevation of 1 foot below the bottom of topsoil and root mat, whichever is greater, will be measured as regular excavation. When areas of unsuitable material are shown on the plans, excavation down to a point 1 foot below the elevations of such material shown on the plans will be measured as regular excavation.

**Payment**: Regular excavation will be paid at the contract unit price per cubic yard of excavation and shall include all labor, equipment, and material required, complete in place, including all excavation, loading, moving of cut and fill material, placement, spreading and compaction of material.

## E. Rock Excavation (other than trenches and pits):

**Measurement**: Rock excavation will be measured by the City Engineer or his representative in its original position, after which the rock shall be excavated to the depth specified by the City Engineer and then measured by the cubic yard. Rock

excavation shall consist of the removal and satisfactory disposal of all materials, which cannot be dislodged and excavated with modern, track-mounted, heavy-duty excavating equipment without drilling, blasting, or ripping. Rock is defined as material which cannot be effectively excavated during general grading with a D-8 or equivalent dozer drawing a new single-tooth ripper. Effective excavation is defined as the ability to remove 10 cubic yards or more of material after one hour of continuous ripping. Typical of materials classified as Rock in Open Excavation are boulders larger than 1-1/2 cubic yards or more in volume, solid rock, rock in ledges, and rock-hard cementitous aggregate deposits.

**Payment**: Rock excavation will be paid for at the contract unit price per cubic yard for rock excavation and shall include all labor, materials, insurance, mats, signage, traffic control, storage containers, and equipment to excavate and dispose of rock off site.

# F. Classified Excavation (Undercut):

**Measurement**: The material shown on the plans as classified excavation (undercut) or determined by the City Engineer to be unsuitable and designated as classified excavation (undercut) and not included in regular excavation will be measured by cross sectioning the undercut area. The number of cubic yards will be computed by average end method. When it is impractical to measure by cross-section method because of erratic locations of isolated deposits, other acceptable methods, involving 3-dimensional measurements may be used if approved by the City Engineer.

Removal and satisfactory disposal of all unsuitable material located below subgrade elevation or 1 foot below the top of the existing natural grade, whichever is greater, 1 foot below the elevation of unsuitable material shown on the plans, or 1 foot below original ground in fill sections where topsoil and root mat are not required to be removed, will be measured as undercut excavation.

**Payment**: Classified excavation (undercut) will be paid for at the contract unit price per cubic yard for classified excavation (undercut) and shall include all labor, equipment, and material required, complete in place, including all excavation and disposal of material.

# G. Unclassified Excavation for Widening of Pavement:

**Measurement**: Unclassified excavation for widening of pavement along existing paved areas and removal of existing paved areas will consist of the removal and satisfactory disposal of all materials except solid rock and concrete structures necessary for the construction of street widening projects including sidewalk and curb and gutter projects. Measured will be made by cross sectioning the widened area. The number of cubic yards will be computed by average end method. No payment for materials removed without authorization from the City Engineer or beyond the lines and grades set by the City Engineer.

**Payment**: Unclassified excavation for pavement widening will be paid for at the contract unit price per cubic yard for unclassified excavation for widening of pavement. The price shall include all labor, equipment, and materials, including

sawing or cutting the existing pavement or concrete, excavation of and disposal of material, preparing the grade, etc., complete in place.

## H. Unclassified Excavation for Removal of Existing Concrete Structures:

**Measurement**: Unclassified excavation for removal of existing concrete structures shall consist of the removal and satisfactory disposal of all materials in concrete structures that may be designated for removal by the City Engineer or shown to be removed on plans. These structures shall include sidewalks, steps, retaining walls, concrete pavement, and other minor structures; measured by the cubic yard in terms of material removed from its original positions. No payment for materials removed without authorization from the City Engineer or beyond the lines and grades set by the City Engineer.

**Payment**: Unclassified excavation for removal of existing concrete structures will be paid for at the contract unit price per cubic yard for unclassified excavation for the type listed. The price shall include all labor, equipment, and materials necessary to remove and dispose of, off site, any required structures, complete in place, including sawing or cutting the existing concrete if required.

I. Other: Other items shall be paid for as stated in the Proposal.

# 1.6 BASE COURSE & PAVING

## A. Adjusting Manholes and Valves for Resurfacing:

**Measurement**: Manhole and valve box adjusting will be measured on an each basis for the type of structure adjusted.

**Payment**: Manhole and valve box adjusting by the method of removing and adjusting the frame and cover. Manholes shall be adjusted as shown on **Standard Detail C06.03**. Manhole and valve box adjustments will be paid for at the contract unit price per each for adjusting manholes and valves, and shall include all labor, equipment, materials (inclusive of concrete grade rings for manholes), feathering asphalt to castings if necessary, etc. for a complete in place installation.

## B. Aggregate Base Course:

**Measurement**: Aggregate base course will be measured by the ton (or, if approved by the City Engineer, in square yards of the thickness as shown on the plans). The quantity shall be determined on scales equipped with a dial and an automatic printer, all of which have been approved and sealed in accordance with Section 106-7, *Scales and Public Weighmaster,* NCDOT *Standard Specifications for Roads and Structures*, latest revision.

**Payment:** Payment: Aggregate base course will be paid at the contract unit price bid per ton for ABC (or by the square yards of a specified depth as shown on the plans, if approved by the City). Price shall include all material, equipment, and labor required to furnish and install the stone, complete in place.

# C. Asphalt Concrete Pavement:

# [Alternate 1: By the ton using Terminal Prices for adjustment]

**Measurement**: Asphalt concrete pavement shall be measured by the actual number of tons of plant mix competed and accepted on the job. Measurement for all roadways will be based on plan quantities and field measurements, verified by tonnage tickets unless otherwise directed by the City Engineer.

**Payment**: Asphalt concrete pavement will be paid for at the "Contract Unit Price" bid per ton for the type of asphalt concrete specified. However, the "Contract Unit Price" per ton will be adjusted to account for variations either up or down in the price of <u>asphalt binder</u> from a "Base Price Index" to yield an "Adjusted Contract Unit Price." The "Adjusted Contract Unit Price" is the price paid at the time the paving/work is placed or performed. The "Adjusted Contract Unit Price" shall be full compensation for asphalt concrete pavement, complete in place, including all materials, labor, tools, equipment, tack coat, maintenance of traffic, and all other incidentals necessary. Adjusting manholes, cleanouts, valve boxes, etc. will be paid separately at the bid price for each when adjusted by the Contractor. Payment will be made on a per ton basis.

## PRICE ADJUSTMENT - ASPHALT BINDER FOR PLANT MIX:

When it is determined that the monthly selling price of asphalt binder on the first business day of the calendar month during which the last day of the partial payment period occurs varies either upward or downward from the "Base Price Index," the "Contract Unit Price" for asphalt binder for plant mix will be adjusted.

The "Base Price Index" provided for asphalt binder for plant mix, per ton, shall be used to compute the "Adjusted Contract Unit Price." The "Base Price Index" to be included in a proposal/contract along the applicable date will be the Monthly Price Index in effect 2 months prior the month in which the contract is let. The "Base Price Index" will remain fixed throughout the life of the contract. This "Base Price Index" represents an average of F.O.B. selling prices of asphalt binder at supplier's terminals.

Price adjustments for asphalt binder for plant mix will be made in accordance with Section 620 of the NCDOT *Standard Specifications*.

[BIDDING NOTE: In preparation of the bid documents, the City must indicate the "Base Price Index" for asphalt binder for plant mix per ton in the form of proposal. Along with this price, show the date of the selling prices of asphalt binder at supplier's terminal. The price and date is obtained from the DOT's website and then inserted into the bid documents.]

The following is a link to the NCDOT website showing the terminal price:

http://www.ncdot.org/doh/operations/dp%5Fchief%5Feng/constructionunit/atp.html

# [Alternate 2: By the SY]

**Measurement**: Asphalt concrete pavement shall be measured in square yards of the type specified as evidenced by area of asphalt installed. Measurement for all roadways will be based on plan quantities and field measurement, not tonnage tickets.

**Payment**: Asphalt concrete pavement will be paid for at the contract unit price bid per square yard for the type of asphalt concrete specified. This price shall be full compensation for asphalt concrete pavement, complete in place, including all materials, labor, tools, equipment, tack coat, maintenance of traffic, and all other incidentals necessary. Adjusting manholes, cleanouts, valve boxes, etc. will be paid separately at the bid price for each when adjusted by the Contractor. Payment will be made per square yard of surface covered. Core samples shall be taken by the Contractor in areas directed by the City. The average depth of the asphalt will be determined from these samples. The unit price paid will be reduced proportionately for each 1/8 inch thickness below the specified thickness. Thicknesses less than 75% of that specified shall receive an additional overlay at the minimum depth recommended by NCDOT for the type of asphalt specified for this project as the surface course. No additional payment will be made for thickness greater than that designed

#### D. Asphalt Concrete Paved Flumes, Walks, etc.:

**Measurement**: Asphalt concrete paved flumes, walks, etc. will be measured in square yards for a depth of 4 inches.

**Payment**: Asphalt concrete paved flumes, walks, etc. will be paid for at the contract unit price bid in square yards for a depth of 4 inches and shall be installed in accordance with applicable NCDOT details and specifications, including all labor, equipment, and materials necessary for a complete in place installation.

#### E. Asphalt Surface Treatment:

**Measurement**: Per square yard of area covered.

**Payment**: Asphalt surface treatment will be paid per square yard of area covered. This price shall include all labor, equipment, and materials to furnish and install, complete in place. See paragraph C for handling adjustments and/or compensation for variations in the price of asphalt binder.

#### F. Foundation Stone:

Spec Writer: Modify "Measurement" and insert this sentence only if you intend to pay by the ton.

**Measurement**: Foundation stone for roadways will be measured by the cubic yard of foundation stone placed.

**Payment**: Foundation stone, if approved by the City Engineer, will be paid for at the contract unit price for foundation stone by the cubic yard. Price shall include removal and disposal of unusable material and placement of stone, complete in place.

# G. Manhole Adjustment for Resurfacing:

**Measurement**: Iron manhole riser adjusting rings are not permitted. Manhole frames and covers shall be raised with brick or concrete riser rings only and measured per manhole.

**Payment**: Manhole adjustment , as shown on **Standard Detail C06.03**, will be paid at the contract unit price per manhole and shall include all labor, material, and equipment necessary to raise the existing frame.

## H. Manhole and Valve Box Replacement for Resurfacing:

**Measurement**: Manhole and valve box replacement will be measured on an each basis for the type of frame installed.

**Payment**: Manhole and valve box replacement for resurfacing will be paid on an each basis for the type of frame installed at the contract unit price and shall include all labor, material, and equipment necessary to remove and install a new frame, complete in place.

 Pavement Repair or Street Rehab: This item shall cover pavement repair in areas where it becomes necessary to remove and replace the existing pavement in failed areas or areas where patching is required as part of roadway work or in locations as otherwise requested by the City Engineer.

**Measurement:** Work and materials for pavement repair will be measured in the following manner.

- 1). Unclassified excavation for pavement repair will be measured in cubic yards of pavement, temporary maintenance stone, or other unclassified material removed.
- 2). Aggregate base stone for pavement repair will be measured in square yards, generally 8 inches deep, but thickness shall be as shown on the plans or as directed by the City Engineer.
- 3). Asphalt base (B 25.0X) for pavement repair (when specified) will be measured by the ton (see <u>paragraph 1.6C</u>, above). The thickness is generally 4 inches deep, but thickness shall be as shown on the plans or as directed by the City Engineer.
- 4). Asphalt surface (S 9.5B) for pavement repair will be measured by the ton (see <u>paragraph 1.6C</u>, above). The thickness is generally 2" deep, but thickness shall be as shown on the plans or as directed by the City Engineer.
- 5). Surface treatment for surface treated pavement repair will be measured in square yards.
- 6). **Temporary pavement repair** will be measured in terms of square yards consisting of a combination of material as defined in these specifications.

**Payment**: Work and materials for pavement repair will be paid for in the following manner.

- Unclassified excavation for pavement repair will be paid for at the contract unit bid price per cubic yard. This price shall include all labor, equipment, and material to saw-cut, excavate, remove and dispose of material, and all work and grading to prepare the surface for paving, complete in place.
- 2). Aggregate base stone for pavement repair will be paid for at the contract unit price bid per square yard generally 8 inches deep, but thickness shall be installed according to the plans for ABC. This price shall include all labor, equipment, and material necessary to furnish and install the stone, complete in place.
- 3). Asphalt base (B 25.0X) for pavement repair will be paid for at the contract unit price bid per ton (see paragraph 1.6C, above) for the type of base mix as shown on the plans or as directed by the City Engineer. This price shall include all labor, materials, and equipment, including tack, necessary to furnish and install the asphalt, complete in place. Core samples shall be taken by the Contractor in areas directed by the City. The average depth of the asphalt will be determined from these samples. The unit price paid will be reduced proportionately for each 1/8 inch thickness below the specified thickness. Thicknesses less than 75% of that specified shall receive an additional overlay at the minimum depth recommended by NCDOT for the type of asphalt specified for this project. No additional payment will be made for thicknesses greater than that designed.
- 4). Asphalt surface (S 9.5B) for pavement repair will be paid for at the contract unit price bid per ton (see <u>paragraph 1.6C</u>, above) for a particular thickness and type as shown on the plans or as directed by the City Engineer. This price shall include all labor, materials, and equipment, including tack, necessary to furnish and install the asphalt, complete in place. Core samples shall be taken by the Contractor in areas directed by the City. The average depth of the asphalt will be determined from these samples. The unit price paid will be reduced proportionately for each 1/8 inch thickness below the specified thickness. Thicknesses less than 75% of that specified shall receive an additional overlay at the minimum depth recommended by NCDOT for the type of asphalt specified for this project as the surface course. No additional payment will be made for thicknesses greater than that designed.
- 5). Surface treatment for surface treated pavement repair will be paid for at the contract unit price bid per square yard for surface treatment for pavement repair. This price shall be full compensation for one prime coat and two seal coats, complete in place.
- 6). Temporary pavement repair will be paid for at the contract unit price bid per square yard for temporary pavement repair. This price shall include aggregate stone to the depth specified on the plans, seal coat, and cold patch, as defined in these specifications and all labor, materials and equipment necessary, complete in place.
- J. Pavement Profiling Milling:

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**Measurement**: Pavement profiling will be measured in square yards for the first 2 inches and then by the square yard for each additional inch of depth of material profiled and removed thereafter.

**Payment**: Pavement profiling will be paid for at the contract unit price bid per square yards for the first 2 inches and then by the square yard for each additional inch of depth and shall include all labor, materials, and equipment necessary to remove and dispose of the material, complete in place.

#### K. Petro-mat, or approved equal:

**Measurement**: Petro-mat, or approved equal, will be measured in square yards based on surface measurements of area covered.

**Payment**: Mat will be paid for at the contract unit price bid in square yards for the type of material specified in these specifications and shall include all labor, equipment, and materials necessary for a complete in place installation.

## L. Portland Cement Treated Aggregate:

**Measurement**: Portland cement treated aggregate will be measured in square yards of material with thickness as shown on the plans or as directed by the City Engineer.

**Payment**: Portland cement treated aggregate will be paid at the contract unit price bid for square yards with thickness as shown on the plans or as directed by the City Engineer. This price shall include all material, equipment, and labor required to furnish and install the Portland cement treated aggregate, complete in place.

M. **Prime Coat** (when specified by City Engineer):

Measurement: Liquid asphalt material will be measured by the gallon.

**Payment**: Liquid asphalt material will be paid for at the contract unit price bid per gallon. This price shall include all labor, equipment, and materials to furnish, install, and maintenance of the treatment until surface course is applied, complete in place.

N. Tack Coat: (Not a pay item, incidental to other items bid)

# 1.7 CURB & GUTTER, DRIVEWAYS, SIDEWALKS, AND MISCELLANEOUS CONCRETE ITEMS

#### A. New Concrete Sidewalk, 4 inches thick:

**Measurement:** New sidewalk shall be measured per square yard of finished concrete at the width and depth specified in the contract.

**Payment:** New sidewalk shall be paid for at the contract unit price bid per square yard of finished concrete. This price shall include all labor, equipment, and material

for excavation, backfilling, expansion joint material, formwork, finishing, curing, etc. for a complete in place installation, as shown on **Standard Detail 404.03** and installed at the locations as shown on the construction drawings and/or as directed by the City Engineer.

#### B. Replacement of Concrete Sidewalk:

**Measurement:** Replacement of sidewalk will be measured per square yard of finished concrete.

**Payment:** Replacement of sidewalk will be paid for at the contract unit price bid per square yard at a depth specified in the contract. This price shall include all labor, equipment, and material for excavation, removal and disposal of existing sidewalk, backfilling, expansion joint material, formwork, finishing, curing, etc. for a complete in place installation as shown on **Standard Detail 404.03** and installed at the locations as shown on the construction drawings and/or as directed by the City Engineer.

#### C. New Concrete Driveways and Entrances:

**Measurement:** New concrete driveways and entrances per design thickness will be measured in square yards of finished concrete.

Driveways formed in conjunction with standard curb, and curb and gutter, shall be measured in square yards as follows:

#### 1) Residential Drives (Standard Detail 404.01):

- i. The width shall be taken as the average width (i.e. drive width at the right of way plus 5 feet; allowing for taper width at back of curb).
- ii. The length shall be measured from the back edge of the driveway at the right-of-way or the back edge of the driveway shown on the plans, as applicable, to the back edge of the curb extended.

#### 2) Commercial Drives (Standard Detail 404.02):

The area shall be computed based on the radii shown on the plans and confined between the back edge of the curb extended and either the right-of-way or the back edge of the driveway shown on the plans, as applicable.

**Payment:** New concrete driveways and entrances will be paid for at the contract unit price bid per square yard at a depth as specified in the design. This price shall include all labor, equipment, and material for excavation, backfilling, expansion material, formwork, finishing, curing, etc. for a complete in place installation, as shown on **Standard Details 404.01** and **404.02** and installed at the locations as shown on the construction drawings and/or as directed by the City Engineer.

#### D. Replacement of Concrete Driveways and Entrances:

**Measurement:** Replacement of concrete driveways and entrances will be measured in square yards of finished concrete.

Driveways formed in conjunction with standard curb, and curb and gutter, shall be measured in square yards as follows:

- 1) Residential Drives (Standard Detail 404.01):
  - i. The width shall be taken as the average width (i.e. drive width at the right of way plus 5 feet; allowing for taper width at back of curb).
  - ii. The length shall be measured from the back edge of the driveway at the right-of-way or the back edge of the driveway shown on the plans, as applicable, to the back edge of the curb extended.
- 2) Commercial Drives (Standard Detail 404.02):

The area shall be computed based on the radii shown on the plans and confined between the back edge of the curb extended and either the right-ofway or the back edge of the driveway shown on the plans, as applicable.

**Payment:** Replacement of concrete driveways and entrances will be paid for at the contract unit price bid per square yard at depth as specified in the design. This price shall include all labor, equipment, and material for excavation, removal and disposal of existing concrete, backfilling, expansion material, formwork, finishing, curing, etc. for a complete in place installation as shown on **Standard Details 404.01** and **404.02** and installed at the locations as shown on the construction drawings and/or as directed by the City Engineer.

## E. New Concrete Curb and Gutter, City Standard:

**Measurement**: New concrete curb and gutter, City standard will be measured per linear foot along the face of the curb for the entire length of the work including portion of curb shaped for handicap ramps and through driveways for the type curb and gutter installed.

**Payment**: New concrete curb and gutter, City standard will be paid for at the contract unit price per linear foot and shall include all labor, equipment, and material for excavation, grading, formwork, stone bedding, backfilling, expansion material, finishing, curing, etc. for a complete in place installation as shown on the **Standard Detail 402.01** and installed at the locations as shown on the construction drawings and/or as directed by the City Engineer.

## F. Replacement of Concrete Curb and Gutter, City Standard:

**Measurement:** Replacement of concrete curb and gutter, City standard will be measured per linear foot along the face of the curb for the entire length of the work including portion of curb shaped for handicap ramps and through driveways for the type of curb and gutter installed.

**Payment:** Replacement of concrete curb and gutter will be paid for at the contract unit price bid per linear foot. This price shall include all labor, equipment, and material for excavation, removal and disposal of existing concrete, backfilling, stone bedding, expansion material, formwork, finishing, curing, etc. for a complete in place installation as shown on **Standard Detail 402.01** and installed at the locations as shown on the construction drawings and/or as directed by the City Engineer.

# G. Vertical Concrete Curb:

**Measurement:** Vertical concrete curb will be measured in linear feet along the face of the curb including handicap ramps and driveway openings.

**Payment:** Vertical concrete curb will be paid in linear foot the contract unit price for 6"X12" curb. Prices shall include all labor, equipment, and material for excavation, formwork, stone bedding, backfilling, expansion joint material, finishing, curing, etc. for a complete in place installation and installed at the locations as shown on the construction drawings and/or as directed by the City Engineer.

# H. Concrete Handicap Ramp:

**Measurement:** Concrete handicap ramps will be measured per ramp for the type ramp designated (double or single).

**Payment:** Concrete handicap ramps will be paid for at the contract unit price bid per ramp. This price shall include all labor, equipment, and material for excavation, removal and disposal of existing concrete, backfilling, stone bedding, expansion material, formwork, finishing, detectable warning surface, curing, etc. for a complete in place installation as shown on the standard details and installed at the locations as shown on the construction drawings and/or as directed by the City Engineer.

# I. Formed Concrete for Retaining Walls, Piers, Steps, and other misc. Concrete Structures:

**Measurement:** Formed concrete for retaining walls, piers, steps, and other misc. concrete structures will be measured per structure specified on the drawings or applicable details.

**Payment:** Formed concrete for retaining walls, piers, steps, and other misc. concrete structures will be paid for at the contract unit price bid per structure, complete in place. All backfilling will be included in bid price for concrete. Payment will be made only for the quantities and dimensions as shown on drawings or applicable details.

#### J. Concrete Paved Ditches:

**Measurement**: Concrete paved ditches will be measured per square yard of paved ditch based on measurements as defined on the applicable details or construction drawings, at the thickness specified

**Payment**: Concrete paved ditches will be paid for at the contract unit price per square yard and shall include all labor, equipment, and material for excavation, formwork, stone bedding, backfilling, expansion material, finishing, curing, etc. for a complete in place installation and installed at the locations as shown on the construction drawings and/or as directed by the City Engineer, at the thickness specified.

# K. Tree Well in Sidewalk :

Measurement: Tree wells will be measured on an each basis.

**Payment**: Tree wells will be paid for at the contract unit price per each and shall include all labor, equipment, and materials to install the tree well, complete in place.

## L. Wheel Bumpers:

Measurement: Wheel bumpers will be measured on an each basis.

**Payment**: Wheel bumpers will be paid for at the contract unit price per each and shall include all labor, equipment, and materials to install the wheel block, complete in place.

# 1.8 ITEMS MISCELLANEOUS TO ALL SECTIONS

## A. Clearing and Grubbing Wooded Areas:

**Measurement**: Measurement for clearing and grubbing will be by the acre. The disturbance shall not exceed width as defined in the construction limits criteria.

**Payment**: Price per acre for clearing and grubbing in wooded areas shall include all material, equipment, and labor required to clear and grub wooded areas in accordance with these specifications. The price shall also include the removal and disposal of items.

## B. Construction Entrance

**Measurement:** Construction entrance for erosion control will be measured on an each basis. Size and depth of stone shall be based on the dimensions, type and depth of stone as specified in the NCDENR, Land Quality Section *Erosion and Sediment Control Planning and Design Manual*, latest revision.

**Payment**: Construction entrance for erosion control will be paid for at the contract unit price per each and shall include all materials, stone, including Geotextile fabric, labor, and equipment necessary for a complete in place installation as well as maintenance.

# C. Flowable Fill Concrete:

**Measurement**: Measurement shall be by the cubic yard of concrete placed, regardless of the specified strength.

Payment: Paid for in place by the cubic yard.

# D. Silt Fence Barrier:

**Measurement**: Silt fence barrier for erosion control will be measured by the linear foot.

**Payment**: Silt fence barrier for erosion control will be paid for at the contract unit price per linear foot and shall include all material, labor, and equipment necessary

for a complete in place installation. The price shall also include the removal, maintenance, and disposal of silt fence upon stabilization of ground cover.

## E. Segmental Retaining Walls (SRW)

**Measurement**: The unit of measurement for furnishing and fabricating the SRW shall be the vertical square foot of wall surface from the top of the leveling pad to the top of the wall or wall coping. Guardrails, barriers, and handrails shall be measured separately.

**Payment**: The accepted quantities of SRW will be paid at the contract unit price, which shall be full compensation for design (if applicable), testing, equipment, tools, labor, and installation of the SRW including face units, caps, leveling pad (stone or concrete), subgrade preparation, unclassified excavation, classified excavation (Undercut), unit drainage fill, soil reinforcement, pins (if applicable), steel tie-backs, steel reinforcing (if applicable), and reinforced backfill and other miscellaneous materials necessary for a complete installation. Foundation stone and off-site select granular borrow will be paid separately.

#### F. SRW - Granular fill for

**Measurement**: The quantities of off-site granular borrow for backfill material hauled in and placed in the reinforced earth zone will be measured in cubic yards.

**Payment**: For Contractor furnished granular backfill material for the reinforced earth zone, the Contractor will be paid for the quantity of material furnished, hauled, placed, and compacted for the contract unit price per cubic yard.

#### G. SRW - Excavation

**Measurement**: Excavation for preparing the reinforced earth zone for construction is considered incidental to the wall construction.

Payment: Not a pay item.

#### H. Sodding, Fertilizing, Seeding and Fine Grading:

**Measurement**: Measurement of surfaces to be sodded or seeded shall be measured to the nearest square yard for the class specified. Sodding, fertilizing, seeding, and fine grading shall be provided as described section in Section 02920, *Seeding, Sodding, and Groundcover.* Extra compensation will not be made for additional seeding beyond all limits of construction as defined in applicable section.

**Payment**: Payment for sodding, fertilizing, seeding, and fine grading will be at the contract unit price square yard for sodding, fertilizing, seeding, and fine grading as described in Section 02920, *Seeding, Sodding, and Groundcover*. No compensation will be made for reseeding, if required. The cost of restoring areas located beyond the designated area(s) shall be borne by the Contractor.

#### I. Temporary Access or Haul Roads

**Measurement**: Any grading or excavation required for equipment travel during the course of construction as well as erosion control, removal, restoration, seeding and ground cover shall be included in other items bid.

Payment: Included in other items bid. Not a pay item.

J. Traffic Control:

**Not a pay item.** The associated work, materials, and labor involved in traffic control are incidental to the cost of construction and shall be included in other bid items.

K. Undercut Excavation:

**Measurement**: The material shown on the plans as undercut excavation or determined by the City Engineer to be unsuitable and designated as undercut excavation, and not included in regular excavation, will be measured by cross sectioning the undercut area. The number of cubic yards will be computed by average end method. When it is impractical to measure by cross-section method because of erratic locations of isolated deposits, other acceptable methods, involving 3-dimensional measurements may be used if approved by the City Engineer.

Removal and satisfactory disposal of all unsuitable material located below subgrade elevation or 1 foot below the top of the existing natural grade, whichever is greater, 1 foot below the elevation of unsuitable material shown on the plans, or 1 foot below original ground in fill sections where topsoil and root mat are not required to be removed, will be measured as undercut excavation.

**Payment**: Undercut excavations will be paid for at the contract unit price per cubic yard for undercut excavation and shall include all labor, equipment, and material required, complete in place, including all excavation and disposal of material.

#### END OF SECTION 00950

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# 02200 – EARTHWORK

(Last revised 5/18/10)

## SELECTED LINKS TO SECTIONS WITHIN THIS SPECIFICATION

Part 1 – General Part 2 – Products Part 3 – Execution Cleanup Clearing and Grubbing <u>Compaction – Frequency</u> <u>Compaction Requirements</u> <u>Earthwork Volume Measurement</u> <u>Geotextile Fabric</u> <u>NPDES</u> Placement Soil Stab Fabric Quality Assurance/Quality Control <u>Rock Definition</u> – Open Excavation <u>Rock Excavation</u> <u>Subgrade Preparation</u> <u>Testing Frequency</u> Undercut Excavation, Definition

# PART 1 – GENERAL

# 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Requirements and Supplementary Conditions applicable to this specification.
- B. Section 00950 Measurement & Payment
- C. Section 02275 Trenching, Backfilling, and Compaction of Utilities
- D. Section 02510 Water Distribution
- E. Section 02530 Sanitary Sewer
- F. Section 02630 Storm Drainage
- G. Section 02632 Segmental Concrete Retaining Wall System
- H. Section 02920 Seeding, sodding, and Groundcover
- I. NCDENR Division of Land Resources, Land Quality Section's "Erosion and Sedimentation Control Planning and Design Manual"
- J. City of Wilson Pre-Approved Material/Product List
- K. City of Wilson Right-of-Way Regulations and Procedures, latest edition

# 1.2 SUMMARY

- A. This section includes:
  - 1) Site clearing and grubbing.
  - 2) Stripping and stockpiling topsoil.
  - 3) Excavation and embankment placement.
  - 4) Preparing subgrades for pavements, walks, curb & gutter, and turfed areas.

- B. Construction and materials related to this section but covered elsewhere:
  - 1) Erosion Control: North Carolina Sediment Control Law.

# 1.3 DEFINITIONS

For the purposes of this specification, the following definitions refer to earthwork that comes under the authority of the City of Wilson as specified within this division and other divisions of this manual.

- A. Borrow: Borrow shall consist of approved fill material imported from off-site.
- B. City Engineer: The City Engineer or his designated representative.
- C. **Clearing**: Clearing shall consist in the felling, cutting up, and satisfactory disposal of trees and other vegetation designated for removal in accordance with these specifications.
- D. **Competent Person**: Competent Person means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.
- E. **Contractor**: Refers to a Contractor licensed in the State of North Carolina to perform grading and earthwork construction.
- F. **Fill (in terms of volume)**: In terms of volume, fill is defined as a compacted post-construction volume in-place.
- G. **Easement**: An instrument that depicts/describes and conveys rights and privileges to the City 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.
- H. **Grubbing**: Grubbing shall consist of the removal of roots 1 ½ inch and larger, organic matter, debris and stumps and the disposal thereof.
- I. Classified Excavation (undercut): Classified 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 fill or stone as ordered by the City Engineer. See also paragraph P, Unclassified Excavation.
- J. Rock in Open Excavation: All boulder, solid ledges, bedded deposits, unstratified masses, and conglomerations of material so firmly cemented as to possess the characteristics of solid rock. Rock in open excavations includes removal and disposal on-site of materials and obstructions encountered in general excavation other than trenches and pits that cannot be dislodged and excavated with modern, track-mounted, heavy-duty excavating equipment without drilling, blasting, or ripping. Rock is defined as material which cannot be

effectively excavated during general grading with a D-8 or equivalent dozer drawing a new single-tooth ripper. Effective excavation is defined as the ability to remove 10 cubic yards or more of material after one hour of continuous ripping. Typical of materials classified as Rock in Open Excavation are boulders larger than 1-1/2 cubic yards or more in volume, solid rock, rock in ledges, and rock-hard cementitous aggregate deposits.

- K. Rock Excavation for Trenches and Pits: Rock excavation for trenches and pits includes removal and disposal off-site of materials and obstructions encountered that cannot be practically excavated with a track-mounted power excavator, equivalent to a Caterpillar Model No. 325 or equivalent equipped with new rock teeth. Practical excavation is defined as the ability to remove at least 30 cubic yards during one hour of continuous digging. Trenches in excess of 10 feet in width and pits in excess of 30 feet in either length or width are classified as open excavation.
- L. Select Fill Material: Nonplastic material, free of organic material, used as foundation for subbase, shoulder surfacing, fill, backfill, or other specific purposes.
- M. **Structures**: Incidental 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.
- N. Subgrade: Surface or elevation remaining after completing the excavation, or top surface of a fill or backfill immediately below subbase or topsoil materials, as applicable.
- O. Topsoil: See Section 02920 Seeding, Sodding, and Groundcover.
- P. Unclassified Excavation: Removal and disposal of any and all material above subgrade elevation or within the 12 inches of existing natural grade, whichever is greater, except solid rock and undercut excavation, located within the limits of construction.

## 1.4 SUBMITTALS

- A. Submit product data and a sample of separation fabric and fully document each with specific location or stationing information, date and other pertinent information.
- B. **Material Test Reports**: Provide from a qualified testing agency test results and interpretation 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 the City Engineer.
  - Laboratory compaction curve according to ASTM D698 for each on-site or borrow soil material proposed for fill or backfill.
  - Laboratory compaction curve according to ASTM D1557 for each on-site borrow soil material proposed for fill and backfill.
- C. Blasting:

- Insurance Certificate naming the City of Wilson as "Additional Insured." See paragraph 3.4 – <u>Rock</u> 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 City and local Fire Department and City officials.
- 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 the City Engineer, seismic survey agency report, for record purposes.

## D. Product Data:

1) Stabilization/Separation fabric

## 1.5 TESTING SERVICES

- A. The Testing Laboratory shall be approved by the City 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 requirements of the Contract Documents and specifically note any deviation.
- B. Specific test and inspection requirements shall be as specified herein.

# 1.6 QUALITY ASSURANCE

- A. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing as documented according to ASTM D 3740 and ASTM E 548. Testing Lab to be AMRL (AASHTO Materials Reference Laboratory) and CCRL (Cement and Concrete Reference Laboratory) certified.
- B. Comply with all codes, laws, ordinances, and regulations of governmental authorities having jurisdiction over this part of the work.
- C. The Contractor shall comply with North Carolina Department of Environment and Natural Resources, "Erosion and Sedimentation Control Handbook," latest revision.
- D. Comply with applicable requirements of NFPA 495, "Explosive Materials Code."

# 1.7 QUALITY STANDARDS

A. Materials and operations shall comply with the latest revision of the Codes and Standards listed below:

# American Society for Testing and Materials

ASTM C33 Concrete Aggregates

| ASTM C136                 | Standard Test Method for Sieve Analysis of Fine and<br>Coarse Aggregates Sieve Analysis of Fine and Coarse<br>Aggregate                  |  |
|---------------------------|--|--|
| ASTM D422                 | andard Test Method for Particle-Size Analysis of Soils<br>r classification purposes only)  |  |
| ASTM D698                 | Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft <sup>3</sup> ) (Standard Proctor). |  |
| ASTM D1556                | Standard Method of Test for Density of Soil in Place by the Sand-Cone Method   |  |
| ASTM D1557                | Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft <sup>3</sup> ) (Modified Proctor)  |  |
| ASTM D1883                | Standard Test Method for CBR (California Bearing Ratio) of Laboratory-Compacted Soils  |  |
| ASTM D2049                | Standard Method of Test for Relative Density of Cohesionless Soils   |  |
| ASTM D2167                | Standard Method of Test for Density of Soil in Place by the Rubber-Balloon Method  |  |
| ASTM D2487                | Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).  |  |
| ASTM D2922                | Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).   |  |
| ASTM D2937                | Standard Test Method for Density of Soil in Place by the Drive-Cylinder Method   |  |
| ASTM D4253                | Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.  |  |
| ASTM D4254                | Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.                                      |  |
| ASTM D4318                | Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.  |  |
| <u>American Associati</u> | on of State Highway & Transportation Officials   |  |
| AASHTO T99                | The Moisture-Density Relations of Soils using a 5.5-pound Rammer and a 12-inch drop.   |  |
| AASHTO M145               | The Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes.   |  |

| AASHTO T180 | The Moisture Density Relations of Soils using a 10-pound Rammer and an 18-inch drop. |  |
|-------------|--|--|
| AASHTO T191 | Density of Soil In-Place by the Sand-Cone Method                                     |  |
| AASHTO T204 | Density of Soil In-Place by the Drive Cylinder Method                                |  |
| AASHTO T205 | Density of Soil In-Place by the Rubber-Balloon Method                                |  |

# 1.8 STANDARD ABBREVIATIONS

| AASHTO | American Association of State Highway & Transportation<br>Officials |  |
|--------|---|--|
| ANSI   | American National Standards Institute                               |  |
| AREA   | American Railway Engineers Association                              |  |
| ASTM   | American Society for Testing and Materials                          |  |
| DWQ    | Division of Water Quality   |  |
| EPA    | Environmental Protection Agency                                     |  |
| MSDS   | Material Safety Data Sheets   |  |
| MUTCD  | Manual on Uniform Traffic Control Devices                           |  |
| NCDENR | NC Department of Environment and Natural Resources                  |  |
| NCDOT  | North Carolina Department of Transportation                         |  |
| NPDES  | National Pollutant Discharge Elimination System                     |  |
| OHSA   | Occupational Safety and Health Administration                       |  |
| USCOE  | United States Army Corps of Engineers                               |  |

# 1.9 PROJECT CONDITIONS

- A. **Demolition**: Demolish and completely remove from the site existing utilities, structures or surface features indicated on the plans to be removed. Coordinate with applicable utility companies to shut off services if lines are active.
- 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. All crossings, disturbance, and encroachments into wetlands shall be subject to US COE and NCDENR Division of Water Quality approval and permitting requirements and conditions.

- 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 the project is exempt or if a permit has been obtained to encroach into such buffers or other such regulated waters, and to what extent work is permitted to occur. Unless otherwise permitted, shown on the contract drawings, or exempted by NCDENR, roadways 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 without approval from NCDENR. When permitted to encroach into zone one of a buffer (the lower 30 feet beside the stream or water), adhere to all of the following Best Management Practices 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.
  - 8) Schedule work in buffers to ensure exposure of denuded surface in the buffer is kept to a minimum

# D. Safety

The Contractor shall keep the surface over and along the roadways and other excavation in a safe and satisfactory condition during the progress of the work.

# E. Geotechnical Investigation

- 1) Where a Geotechnical report has been provided to the Contractor by the City of Wilson, the data on sub-surface soil conditions is not intended as a representation or warranty of the continuity of such conditions between borings or indicated sampling locations. It shall be expressly understood that the City of Wilson will not be responsible for any interpretations or conclusions drawn there from by the Contractor. The data is made available for the convenience of the Contractor.
- 2) In addition to any report that may be made available to the Contractor, the Contractor is responsible for performing any other soil investigations felt necessary for proper evaluation of the site for the purposes of planning and/or bidding the project, at no additional cost to the City of Wilson.

# F. Protection of pavement

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.

# 1.10 SERVICE INTERRUPTION

For service interruption, operation of valves, taps, fire hydrant operation, etc, contact the Water Resources Division at 296-3403. Provide a minimum of 48 hours notice or desired utility interruption or necessary operation of valves or hydrants.

# 1.11 COORDINATION

A. Coordinate tie-in to municipal water mains with the City Engineer and/or the Water Resources Manager. Except as needed for fire suppression purposes, the City of Wilson will be the sole operator of all valves and hydrants on the City's water distribution system. When no customers will be affected, the City shall be notified at least 24 hours in advance of a request for the City to operate valves.

Service is to be continuously maintained to customers in the project areas except for the minimum amount of time required to make connections to the existing system. However, if service is to be interrupted by shutting off a main(s), adequate notification to water customers shall be given by the Contractor prior to any interruption of service. Residents are to be notified at least 24 hours in advance of cut off using flyers.

In the case of an emergency, a Contractor or plumber will be permitted to employ measures with respect to valve and fire hydrant operation as required for the protection of life and property. Notification must be made to the City as soon as possible after the emergency occurs stating what the emergency was and the measures taken to mitigate the emergency.

- B. Coordinate tie-ins to municipal roadway system with the City of Wilson.
- C. At the direction of the City Engineer and/or Water Resources Manager, temporary bypass pumping of sewerage flow may be required to be provided. See Section 02530 Sanitary Sewer for bypass pumping requirements and procedures.
- D. When traffic signals, loops, or their appurtenances are likely to be damaged or interfere with construction, coordinate temporary operation with the applicable agency having jurisdiction of the signals. Provide a minimum of 1 weeks notice prior to anticipated disturbance or interruption. At the discretion of the City Engineer, the notice may be required to be published in the newspaper.
- E. **Repair of pavement markings**: When cuts are made through any paved surface and the cuts extend through the pavement markings, the replaced pavement shall be marked to match the existing.
- F. Benchmark/Monument Protection: Protect and maintain benchmarks, monuments or other established reference points and property corners. If disturbed or destroyed, they must be replaced at own expense by a Licensed Professional Surveyor to full satisfaction of Owner/City of Wilson.
- G. Before Digging, contact "NC One Call" at 811 for location services.



# 1.12 PUBLIC CONVENIENCE

The contractor shall at all times so conduct his 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 fire fighting 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 the City Engineer.

# 1.13 TRAFFIC CONTROL

- A. When working within any NCDOT System road or highway, 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.
- B. 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.
- C. A traffic control plan shall be submitted to the City Engineer and NCDOT (if applicable) for approval.
- D. When traffic signals or their appurtenances are likely to be damaged or interfere with construction, coordinate temporary operation with the NCDOT or the City Engineer. Provide 1 weeks notice prior to anticipated disturbance or interruption.
- E. Whenever it becomes necessary to leave a section of trench open after completion of the days 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.

# 1.14 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 Land Resources (or approved local program).

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.

- 2) 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.
- 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.
- 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).
- 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 Quality.

- All erosion and sedimentation control facilities shall be inspected by or under the direction of the permittee (the Owner and his/her Contractor). 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) list<sup>1</sup> for construction related indicators of impairment such as turbidity or sedimentation),

b. And within 24 hours after any storm event of greater than 0.5 inches of rain per 24-hour period.

The Contractor shall maintain a rain gauge on the site and keep a record of the rainfall amounts and dates.

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 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<br>Characteristics          | Monitoring<br>Type <sup>1</sup> | Monitoring Location <sup>2</sup> |
|--|---------------------------------|----------------------------------|
| 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:

<sup>1</sup> Monitoring Type: The monitoring requires a qualitative observation of each stormwater outfall. **No analytical testing or sampling is required**. <sup>2</sup> Sample (observation) location: **SDO= Stormwater Discharge Outfall** 

- 3) The operator (Contractor) shall keep a record of inspections and forward copies of these reports to the City 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 the sediment that has left the disturbed limits shall also be recorded. These records shall also be made available to DWQ or an authorized agent upon request. If the City 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 the City along with the "red lined" record water and/or sewer drawings.

### C. Schedule of Compliance

<sup>&</sup>lt;sup>1</sup> The latest approved list may be obtained from the Division of Water Quality, or from the following website location: <u>http://h2o.enr.state.nc.us/su/construction303d</u>.

- 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.
- 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 MATERIALS

**General**: Provide borrow material when sufficient satisfactory soil material is not available from excavations.

# 2.1.1 MATERIAL CLASSIFICATION

- A. **Excavation**: All excavation material shall be classified as Undercut Excavation, Unclassified Earth Excavation, or Rock.
- B. Off-site Borrow shall be select fill material approved by the City Engineer from an off-site borrow source. See <u>section 1.3</u> of this specification for the definition of select fill material.

**Rip Rap and Rip Rap Bedding**: Rip Rap and Rip Rap Bedding shall conform to Section 1042 – *Rip Rap Materials* of the NCDOT *Standard Specifications for Roadways and Structures*, latest revision for Class A, B, 1, and 2 rip rap.

- C. **Structures, Backfill around**: Backfill shall be approved by the City 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 #57 or #67 clean stone.
- D. **Topsoil**: Topsoil meeting the definition prescribed in <u>section 1.3</u> obtained either from on-site or an off-site source.

#### 2.1.2 SOIL CLASSIFICATION

- A. Satisfactory Soils: ASTM D2487 soil classification group (Unified Soil Classification System) GC, SM, SC, ML, CL, CH and MH or a combination of these group symbols. However CH and MH are permitted provided the soils have a Liquid Limit (LL) of ≤ 60 and a Plasticity Index (PI) of ≤ 30. Soils shall be free of rock or gravel larger than 3 inches in any dimension, debris, organic matter, waste, frozen materials, muck, roots, vegetation, and other deleterious matter.
- B. Unsatisfactory soils: ASTM D2487 soil classification group (Unified Soil Classification System) CH and MH soils having a LL of > 60 and a Pl of > 30, OH, OL, and PT; soils which contain rock or gravel larger than 3 inches in any

dimension, debris, organic matter, waste frozen materials, vegetation, and other deleterious matter. Unsatisfactory soils also include satisfactory soils not maintained within +/- 3% of optimum moisture content at time of compaction, unless otherwise approved by the City Engineer.

# 2.2 MISCELLANEOUS

# 2.2.1 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. All geo-fabric to be used within the right-of-way of a City street must be approved by the City Engineer.

- A. Filter Fabric for Rip Rap: Filter Fabric for Rip Rap and Rip Rap Beddings shall conform to Section 1056 – Engineering Fabrics of the NCDOT Standard Specifications for Roadways and Structures, latest revision for Type 2 engineering fabric.
- B. **Soil Stabilization Fabric**: Generally, soil stabilization fabric shall conform to the requirements of Section 1056 *Engineering Fabrics* of the NCDOT *Standard Specifications for Roadways and Structures*, latest revision for Type 4 engineering fabric. However, provide fabric meeting Geotechnical Engineers recommendations for the application and use intended.
- C. Fabric for Subsurface Drains: Non-woven needle-punched fabric shall conform to Section 1056 *Engineering Fabrics* of the NCDOT *Standard Specifications for Roadways and Structures*, latest revision for Type 1 engineering fabric.
- D. **Silt Fence Fabric**: Silt fence fabric shall conform to Section 1056 *Engineering Fabrics* of the NCDOT *Standard Specifications for Roadways and Structures*, latest revision for Type 3 engineering fabric, Class A or B as specified or shown on the plans.

# PART 3 – EXECUTION

# 3.1 GENERAL

# 3.1.1 GENERAL REQUIREMENTS APPLYING TO ALL AREAS

- A. Contractor shall plan construction to minimize disturbance to properties adjacent to the project site and be within the construction limits shown on the plans.
- B. The City 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.
- C. 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.

- D. The Contractor shall be responsible for damage to areas or items designated by the City Engineer to be protected. Repairs to, replacement of, or reparations for areas or items damaged shall be made at the Contractor's expense and to the satisfaction of the City Engineer before acceptance of the completed project.
- E. The Contractor shall protect all existing buildings or structures.
- F. 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 the City Engineer at no additional cost.
- G. The Contractor shall obtain written permission from property owners for use of any access other than ones located within rights-of-way or easements. Written permission shall contain conditions for use and restoration agreements between the property owner and the Contractor.
- H. All areas disturbed shall be restored to a condition equal to or better than their original condition and shall be graded to drain.
- I. The Contractor shall replace or repair all damaged or destroyed hedgerows and property corners using the services of a licensed Professional Surveyor.

# 3.1.2 CONSTRUCTION LIMITS

- A. The Contractor shall not disturb any areas outside the limits contained in this section without express written permission from the City Engineer.
- B. Except as indicated on the plans, no "clear cutting" of timber shall be permitted within the construction limits. The Contractor shall make select cutting of trees, taking smallest trees first, that are mandatory for the construction. The decision of the City Engineer shall be final on the determination of which trees are to be cut.
- C. Should it become necessary to move the position of any underground structure, the Contractor may be required to do such work and shall be paid on a force account basis or on an extra work basis as directed by the City Engineer. Method of payment shall be agreed upon by the City Engineer and the Contractor prior to commencing work.
- D. If existing utilities are found to interfere with the permanent facilities being constructed under this section, immediately notify the City Engineer and secure instructions. Do not proceed with permanent relocation of utilities until instructions are received from the City Engineer.

## E. Specific requirements applying to developed subdivision/lots

 Unless directed otherwise by the City Engineer, all trees, shrubs, hedges, or other ornamental plantings located outside of the construction limits, easements, or public rights-of-way shall be protected by the Contractor. The City Engineer reserves the right to designate certain trees located within the construction limits for protection where deemed desirable.

- 2) The Contractor shall protect septic systems or springs located outside the construction limits.
- 3) Excavated or blasted rock shall be removed from the site unless otherwise ordered by the City Engineer.

## F. Specific requirements applying to undeveloped areas

 In wooded areas, the clearing shall be limited to the easement or right-ofway limits unless indicated otherwise on the City of Wilson approved construction drawings, in which case, the work shall be confined to the limits defined on the plans. All permanent easements and rights-of-way shall be fully cleared as determined by the City Engineer. the City Engineer reserves the right to designate certain trees located within the construction limits for protection where deemed desirable.

# 3.1.3 PROTECTION OF EXISTING UTILITIES AND STRUCTURES

## A. Subsurface obstructions

 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 48 hours

prior to excavations. Contact underground damage protection services NC One Call at 800-632-4949 or current locator service. Secure and examine local utility surveyor records for available location data including building service lines.



Unless shown to be removed, protect active utility lines shown on the drawings or otherwise made known to the Contractor prior to excavation. 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 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. This includes water taps and sewer cleanouts installed by a contractor during new construction to be taken over by the City of Wilson.

- 2) The Contractor shall be responsible for anticipating and locating underground utilities and obstructions. When construction appears to be in close proximity to existing utilities, test pits shall be made a sufficient distance ahead of the work to verify the exact locations and inverts of the utility to allow for changes in grade or utility relocation.
- If active utility lines are encountered, and are not shown on the Drawings or otherwise made known to the Contractor, promptly take necessary steps to assure that service is not interrupted.
- 4) Should it become necessary to move the position of any underground structure, when approved by the City Engineer, the Contractor may be required to do such work and shall be paid on a force account basis or on an extra work basis.
- 5) If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the City Engineer and secure his instructions. Do not proceed with permanent relocation of utilities until written instructions are received from the City Engineer.

# B. Protection of Surface Features

- Whenever construction is to take place on 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 his expense to the satisfaction of the City Engineer.
- 2) Where joining existing pavements, the Contractor shall use care to cut the existing pavement in sharp, neat lines. If the existing road to be cut is located within another jurisdiction other than the City of Wilson or within NCDOT rights of way, the Contractor is responsible for contacting the person or persons responsible for said road about pavement repair/replacement.
- 3) Avoid overloading or surcharge a sufficient distance back from edge of excavation or fill to prevent sloughing, slides, or caving. Maintain and trim excavated materials in such manner to be as little inconvenience as possible to public and adjoining property.
- 4) Provide full access to public and private premises, to fire hydrants, at street crossings, sidewalks and other points as designated by the City Engineer to prevent serious interruption of travel.
- 5) Protect and maintain benchmarks, monuments, or other established points and reference points and if disturbed or destroyed, items shall be replaced by a Licensed Land Surveyor to full satisfaction of the City Engineer and the jurisdictional agency.
- 6) See <u>1.11 Coordination, paragraph D</u> regarding traffic signal conflicts.

# C. Procedures for repairing damaged utility services

- 1) If a located service is interrupted as a result of work performed by a public or private party, immediately repair the damaged utility at no additional cost to the City. Notification shall be made to the Utility owner.
- 2) House services: If a service pipe supplying water or sewer service to an adjoining house is broken, the Contractor shall repair it at once and at his expense. The City may, at the Contractor's expense, repair any such service without prior notice to the Contractor.
- 3) If damage results from the action of either a public or private party on a newly constructed project to be accepted by the City of Wilson (e.g. water, sanitary sewer, storm sewer, or street), immediate notification shall be given to the City Engineer or City Inspector. All damages or interruption shall be the responsibility of the party causing the damage.

# 3.1.4 PROTECTION OF PERSONS AND PROPERTY

- A. Barricade open holes and depressions occurring as part of the work, and post warning lights on property adjacent to or part of public access.
- B. 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.
- C. **Protection and Restoration of Property:** The Contactor shall not enter upon private property for any purpose without first obtaining written permission. He shall use every precaution necessary to prevent damage or injury to any public or private property, trees, fences, monuments, and underground structures, etc., on and adjacent to the site of the work. He shall protect from disturbance or damage all land monuments and property markers until an authorized agent has witnessed or otherwise referenced their locations, and shall not remove them until directed.

The Contractor shall be responsible for all damage or injury to property of any character resulting from any act, omission, neglect, or misconduct in his manner or method of executing said work, from his nonexecution of work, or from defective work or materials, and he shall not be released from said responsibility until the work shall have been completed and accepted.

When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work, he shall restore such property, at his own expense, to a condition equal to or better than that existing before such damage or injury was done, by repairing, rebuilding, or otherwise restoring, and may be directed or he may make good such damage or injury in an acceptable manner.

The Contractor shall, at his own expense, sustain in their places and protect from direct or indirect injury all pipes, poles, conduits, walls, roadways, buildings, and other structures, utilities and property in the vicinity of his work. Such sustaining and supporting shall be carefully done by the Contractor and as required by the Company or party owning the structures or Agency controlling it. The Contractor shall take all risks attending the presence or proximity of pipes, poles, conduits, walls, thereof and any costs associated will be deducted from any monies due the Contractor. Failure of the City Engineer or his/her authorized representative to direct the correction of unsafe conditions or practices shall not relieve the Contractor of his responsibility hereunder.

# 3.2 CLEARING AND GRUBBING

- A. **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 the City 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.
- B. A preconstruction meeting shall be held with appropriate forestry personnel (if applicable) and the City prior to any clearing, if required. The City Engineer may require tree protection fencing in sensitive areas, where specifically identified trees are desired to be protected, and when required by the landscape ordinance.
- C. The area within the limits of construction or as designated shall be cleared and grubbed of all trees, stumps, roots, brush, undergrowth, hedges, heavy growth of grasses or weeds, debris and rubbish of any nature that, in the opinion of the City Engineer, is unsuitable for foundation material. Nonperishable items that are not deleterious to the project and will be a minimum of 5 feet below the finish elevation of the earthwork or slope of the embankment may be left in place.
- D. 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.
- E. Contractor shall protect existing trees and other vegetation indicated by the City 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.
- F. Carefully and cleanly, cut roots and branches of trees indicated to remain where the roots and branches obstruct construction of a proposed utility line. If directed by the City Engineer, the Contractor shall provide protection for roots and branches over 1 ½ inches diameter that is 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.

- G. Trees and vegetation designated to remain shall be repaired or replaced at Contractor's expense in a manner acceptable to the City Engineer if they are damaged by construction operations. Repair tree damage as directed by a qualified tree surgeon.
- H. 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.
- I. 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.
- J. **Marginal Areas**: In marginal areas, with the City Engineer's permission, remove trees where the following conditions exist.
  - 1) **Root Cutting**: When clearing up to the "clearing limits," the Contractor shall also remove any tree which is deemed marginal such that when the roots are cut and the tree could be rendered unstable by the affects of high winds and in danger of toppling into either the right-of-way or onto private property.
  - 2) Slender Bending Trees: Where young, tall, thin trees are left unsupported by the clearing operation, and are likely to bend over into the right-of-way, the Contractor, during the clearing operation, shall selectively remove those trees which are located outside and adjacent to the clearing limits and City right-of-way or easement as well. During the course of construction and during the one-year warranty period, the Contractor shall remove such young trees that overhang into the right-of-way or cleared area.
- K. 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 respread 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.
- L. **Disposal**: All brush, treetops, stumps, and debris shall be hauled away and disposed of in accordance with all applicable laws and regulations. The Contactor shall clean up debris resulting from clearing operations continuously with the progress of the work and remove promptly all salvageable material that becomes his 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 the City. 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, limbs, roots, and stumps from trees shall be disposed of in a NCDENR 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.

## 3.3 UNCLASSIFIED EXCAVATION, UNDERCUTTING, BORROW, EMBANKMENT:

#### 3.3.1 DESCRIPTION

Prior to beginning grading or embankment operations in any area, all necessary clearing and grubbing in that area shall have been performed in accordance with these specifications.

Should the Contractor, through negligence or other fault, excavate below the designated grades, he shall replace the excavation with approved satisfactory materials, in an approved method, at his own expense. All material determined unsatisfactory shall be disposed of in waste areas as directed. Topsoil shall not be used in embankments but shall be handled and placed as directed.

The Contractor shall satisfy himself as to the character, quantity, and distribution of all materials to be excavated. No payment will be made for any excavated material that is used for purposes other than those designated.

## 3.3.2 CONSTRUCTION METHODS

A. **Excavation**: Excavation shall be performed as indicated on the plans or as directed by the City Engineer to the lines, grades, and elevations, and shall be finished to a reasonable smooth and uniform surface. During the process of excavation, the grade shall be maintained and surface shall be shaped and rolled so that it will be well drained at all times.

When solid rock is incurred in the excavation, the rock shall be removed to a minimum depth of 12 inches below the surface of the subgrade. Material unsatisfactory for subgrade foundation shall be removed to a depth specified to provide a satisfactory foundation. The portion so excavated shall be refilled with suitable material obtained from the grading operations or borrow area and thoroughly compacted by rolling. The City Engineer must approve material obtained from on site grading operation. For areas that do not require fill, scarify and compact to a depth of 6 inches.

Any removal, manipulation, aeration, replacement, and recompaction of suitable materials necessary to obtain the required density shall be considered as incidental to the construction operations, and shall be performed by the Contractor at no additional cost to the City.

No rock, stone, or rock fragments, larger than 3 inches in their greatest dimension will be permitted in the top 12 inches of the subgrade. No rock, stone, or rock fragments larger than 8 inches in their greatest dimension will be permitted in the remainder of the fill.

B. Stabilization of soft subgrade with Geotextile: The use of Geotextile material for subgrade stabilization shall be approved by the City Engineer (or a Geotechnical Engineer if required) and shall meet the requirements of paragraphs 2.2.1.B – <u>Soil Stabilization Fabric</u> and 3.9 – <u>Placement of Soil Stabilization Fabric</u>.

C. Borrow: Borrow shall not be used until all suitable, on-site, excavated material has been placed in the embankment, unless authorized by the City Engineer. Unless otherwise designated on the plans and contract documents, the Contractor shall make his own arrangements for obtaining select fill material for borrow and pay all costs involved. If the Contractor places more borrow than is required, and thereby causes a waste of excavation, the amount of such waste, unless authorized, will not be included for payment.

#### D. Embankments:

- 1) **Evaluation of Subgrade**: Prior to placement of compacted fill, the City Engineer or his representative shall carefully inspect the exposed subgrade.
- 2) Evaluation of Subgrade: Prior to placement of compacted fill, the City Engineer or his representative shall carefully inspect the exposed subgrade. The Contractor shall then proof roll the exposed subgrade, in the presence of the City Engineer or his representative. The inspection shall include, but not be limited to, proof rolling the prepared subgrade with a rubber-tired fully loaded dump truck that has a minimum gross weight of at least 30,000 pounds (H15). No other method will be acceptable. Any unsatisfactory materials thus exposed shall be removed and replaced with satisfactory select material as approved by the City Engineer. Provide the necessary amount of select fill compacted to the density requirements outlined in this specification.
- 3) Preparation of Ground Surface for Embankments or Fills. Before fill is placed, scarify existing grade to a minimum depth of 6 inches. In areas where the existing or proposed ground surface is steeper than one vertical to four horizontal (4:1), plow surface in a manner to bench and break up surface so that fill material will bind with the existing surface.
- 4) Embankments shall be made of satisfactory soil material and shall be built in successive horizontal layers of not more than 8 inches in loose depth for the full width of the cross sections.

The material entering the embankment in each of the layers shall be within a tolerance of plus or minus +/- 20% of the optimum moisture content before rolling to obtain the prescribed density. Wetting or drying of the material and manipulation when necessary to secure uniform moisture content throughout the layer shall be required. Should the material be too wet to permit proper compaction or rolling, all work on the embankment shall be delayed until the material has dried to the required moisture content. If high moisture is due to negligence of Contractor due to improper drainage, the City Engineer may require removal and replacement of material.

Fill material shall not be placed on frozen ground or areas covered with ice and/or snow or areas with a moisture content above optimum.

#### E. Undercut Excavation:

**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 borrow as ordered by the City Engineer.

For definition of undercut excavation, see <u>paragraph 1.3 I – Classified</u> <u>Excavation (Undercut)</u>.

#### F. Preparation of areas to receive asphalt pavement or concrete:

- Areas to be paved: After all excavation, undercutting, and backfilling has been completed, the subgrade shall be properly shaped and thoroughly compacted. The compactive effort shall include all areas beneath pavement and shall extend at least a minimum of 1 foot behind the paving limits. Compaction shall be in accordance with <u>Table 02200-2A</u>.
- 2) The Contractor shall then proofroll the exposed subgrade, in the presence of the City Engineer or his representative. The inspection shall include, but not be limited to, proof rolling the prepared subgrade with a rubber-tired fully loaded dump truck that has a minimum gross weight of at least 30,000 pounds (H15). Proof rolling shall be performed in lengths of not less than one block as measured from center of intersection to center of intersection, from center of intersection to end of cul-de-sac, or 750 linear feet. No other method will be acceptable. Any unsatisfactory materials thus exposed shall be removed and replaced with satisfactory select material as approved by the City Engineer. Provide the necessary amount of select fill compacted to the density requirements outlined in this specification.

Areas that rut or pump excessively under the wheels of the proof-roller shall be repaired by the developer before the street is paved. Should the developer disagree with the representative of the City about the need for repairs to the subgrade, the developer or his project engineer may hire a Licensed Professional Engineer to perform CBR tests on the prepared subgrade. If the Engineer certifies that the full width and length of the subgrade will provide adequate support for the design pavement section and the anticipated loading for the design life of the paved area, the area may be paved without making repairs to the subgrade.

 Curb and gutter, sidewalks and driveway aprons: The subgrade shall be constructed true to grade and cross section as may be shown on the drawings or standard details. Compaction shall be in accordance with <u>Table</u> 02200-2A.

All subgrade shall be graded and protected as to prevent an accumulation of standing water, and consequent subgrade saturation, in the event of rain.

- G. **Grading tolerances of finished surface**: Earthwork shall conform to the lines, grades, and typical cross sections shown on the plans, standard details, or as established by the City Engineer. Changes in grade shall be accomplished by smooth curves.
  - 1) Shape subgrade under pavement and curb and gutter to within ½ inch of required subgrade elevations.

- 2) Finish pavement and curb and gutter to within 1/4 inch of required finish elevations.
- 3) Shape subgrade under sidewalks to within 0.10 foot of required subgrade elevations.
- 4) Finish sidewalks to within 0.10 foot of required finish elevations.
- 5) For all other areas, subgrade and finish elevations shall be within 0.10 foot of required corresponding elevations.
- H. **Backfill of Curb and Gutter and sidewalks**: Immediately after the removal of forms for curb and gutter, sidewalks and driveways, the space between the back of the curb, sidewalks, and driveways shall be backfilled and smoothed off in a manner to prevent the accumulation of standing water.

#### 3.4 ROCK:

#### 3.4.1 GENERAL

- A. 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 City Engineer and Fire Marshall shall be obtained before any blasting takes place and the City Engineer may fix the hours of blasting if he/she deems it 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.
- B. Rock Excavation Definition: See paragraph 1.3 J for <u>definition of rock</u> excavation in open excavation.
- C. The minimum insurance coverage for blasting shall be as specified by current NC Fire Prevention Code or more as determined by the City Engineer and Fire Marshall. 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 City and the property owners shall be named as "additional insured."

**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. Detonators shall be stored separately from explosives. 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.

D. The City may prohibit blasting when the method of detonation or the means of protection provided is inadequate. Blasting conducted with or without direct

supervision of the City will not relieve the Contractor of the responsibilities stipulated herein.

- E. 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.
- F. 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.
- G. 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.

## 3.4.2 BLASTING PROCEDURE

- A. 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 five 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 the City Engineer and Fire Marshall. The signs shall list the blast warning signal system, the Contractor Superintendent's name and telephone number, and the City representative's name and telephone number.
- B. 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 D-8 or equivalent dozer drawing a new single-tooth ripper (see paragraph 1.3 G for definition of rock excavation in open trenches). If these procedures do not offer reasonable production for rock excavation, then blasting will be allowed unless otherwise indicated.
- C. The Contractor shall notify in writing all property Owners within 250 feet of the proposed blast at least 1 week prior to the proposed blast and verbally on the day of the scheduled blast.
- D. 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 the City daily.
- E. The use of unconfined explosives shall be prohibited.
- F. 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.

- G. 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 his liability.
- H. The peak overpressure of air blast shall not exceed 0.015 pound per square inch or 138 decibels.
- Preblast meetings shall be scheduled with the City Engineer and Fire Marshall 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.
- J. Preblast and post blast surveys shall be performed by the Contractor. The Contractor may review this data and supplement it as he sees fit or conduct separate survey after written permission is obtained from the property Owners. In this event, the written permission shall be submitted to the City Engineer and Fire Marshall prior to entering upon private property. The preblast and post blast surveys will include all occupied buildings within 250 feet of blasting areas. The Contractor is strongly encouraged to have a representative present during these surveys. The preblast and post blast surveys performed by the City or the property owner in no way relieve the Contractor of his liability.
- K. The City reserves the right to monitor production blasting. In this event, the Contractor shall provide the City Engineer and Fire Marshall ample notice of scheduled blasts (minimum of 24 hours) to allow set-up of monitoring equipment.

# 3.4.3 DISPOSAL OF ROCK

Excavated rock shall be hauled off the site at the Contractor's expense. Borrow required to replace excavated rock shall be provided by the Contractor and shall be included in the unit price bid for rock excavation in open trenches. No rocks or boulders shall be used as backfill in any part of the site unless otherwise approved by the City Engineer. 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 the City.

#### 3.5 SUBGRADE COMPACTION TESTING AND CONTROL

#### A. Testing

Testing of embankment/borrow shall be performed by an independent laboratory approved by the City and the Contractor. The Contractor shall be responsible for excavation for testing if required.

# Quality Assurance vs. Quality Control:

Quality Assurance (QA) testing, and the associated cost, is the responsibility of the City. Quality Assurance testing by the City is used to confirm that the Contractor is generally performing his/her work in compliance with these specifications.

Quality Control (QC) testing is the necessary and required testing that is to be performed by the Contractor to assure that he/she is meeting and complying 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 the City when the City tests results (tests for Quality Assurance) results in a "failure."

Quality Control (QC) testing for City funded projects: The City shall pay for the cost of Quality Control by having the Contractor include the cost for testing in the unit cost of the project; not as a separate pay item. The Contractor shall pay for all costs associated with re-testing.

#### B. Quality Assurance (QA):

In the course of placement of embankment fill/borrow or in utility trench backfill, the City Engineer may require additional "Field Density Determinations" or compaction tests. Such tests will be at the City's expense. When compaction tests are called for by the City, the City Engineer will determine the location of the tests and the City shall engage a qualified testing firm to perform the test. A representative of the City will observe tests and a copy of the test results and inspection report will be submitted by the testing firm directly to the City Engineer. When the tests indicate that the density failed to meet the requirements of Tables <u>02200.2A</u> and <u>2200.2B</u>, the Contractor shall comply with paragraph 3.6 D, Failure of Compactive Efforts.

**Payment for failed QA density tests**: For City funded projects, payment for failed in-place density tests shall be made by the Contractor by deducting the testing cost from the forthcoming retainage. For other projects in which the City will ultimately assume ownership and maintenance, the testing costs for failed in-place density tests shall be billed directly to the Contractor.

- C. Quality Control (QC): The Contractor shall perform in-field density tests in accordance with Table 02200-1. Inspection reports shall be submitted by the testing firm directly to the City Engineer. See <u>paragraph 3.6 C, Passing Test</u>.
  - 1) All test results shall be provided to the City Engineer as they become available from the testing agency.
  - The Geotechnical testing firm is to perform laboratory tests (ASTM D698, Standard Proctor) to establish a moisture-density relationship for all materials that are proposed to be used as fill.
  - 3) Contractor shall give a 24-hour notice to Geotechnical testing firm for subgrade testing, subgrade confirmation, or inspections.
  - 4) Minimum Compaction Testing Frequency:

The following testing frequency shall be employed on both City funded projects and projects proposed to be turned over to the City for maintenance and/or ownership.

| Table 02200-1   |  |  |
|---|--|--|
| Testing Frequency   |  |  |
| Location  | Frequency  |  |
| Buildings and structures  | 1 test group <sup>a</sup> for every 5,000 square feet  |  |
| Road  | 1 test group <sup>a</sup> for every 300 feet of road   |  |
| Parking Lots  | 1 test group <sup>a</sup> for every 10,000 square feet   |  |
| Unpaved areas   | 1 test group <sup>a</sup> for every 20,000 square feet   |  |
| Pipe Trenches in<br>Roadways  | 1 test group <sup>a</sup> for every 100 feet<br>1 test in each lateral (not to be taken at<br>surface of trench) |  |
| Proof Roll  | Entire surface area to be paved  |  |
| <b>Exception:</b><br>Where additional tests are required to determine the extent of unacceptable compaction (having been determined by the initial QA/QC test). |  |  |

<sup>a</sup> One test group consists of compaction tests on each layer of fill and backfill material.

D. Site access for testing: Ensure City, 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.

# 3.6 SUBGRADE PREPARATION AND COMPACTION REQUIREMENTS

- A. **Confirmation of Initial Geotechnical Report/Design Assumptions** (for roadway projects to be turned over to the City): Prior to placement of stone base over the subgrade, the Geotechnical Engineer or his representative shall confirm the initial test results and design assumptions by visual classification and hand augur borings. If the visual findings are at variance with the initial testing and design assumptions, recommendations for modifications to the subgrade shall be provided to the designer, the Grading Contractor, and the City Engineer. The City Engineer shall approve the proposed recommendations prior to incorporation of the measures. See <u>Table 2200.4</u>.
- B. **Minimum Compaction Requirements**: Compaction percentages are percentages of maximum dry density as determined by indicated ASTM Standards. Unless noted otherwise on drawings or more stringently by other sections of these specifications, place and ensure degree of compaction of embankment and borrow materials does not fall below the following percentages of the maximum density at optimum moisture content.
- C. **Passing Test:** Average of 3 test results meeting the applicable provisions of tables <u>2200.2A</u> and <u>2200.2B</u> (below) with no one test failing by more than -3 percentage points. Moisture content tolerance is to be within +/- 3 percentage points of the optimum moisture content unless otherwise specified by the City Engineer or Geotechnical Engineer.

|  | Table 220  |   |  |
|--|--|---|--|
| Minimum Compaction Limits                                      |  |   |  |
| Location   |  | Density   |  |
| Site and Public Roadways                                       |  |   |  |
| Embankment/borrow<br>under roadway<br>pavement surfaces,       | Top 12<br>inches   | 100% of the maximum dry<br>density by ASTM D698<br>(Standard Proctor), AASHTO<br>T99. |  |
| sidewalks, and curb<br>and gutter                              | Up to<br>within 12<br>inches   | 95% of the maximum dry density<br>by ASTM D698 (Standard<br>Proctor), AASHTO T99.     |  |
| Roadway Shoulders  | 95% of the maximum dry density by ASTM D698<br>(Standard Proctor), AASHTO T99. |   |  |
| Under turf, sodded,<br>planted, or seeded<br>non-traffic areas | 90% of the maximum dry density by ASTM D698<br>(Standard Proctor), AASHTO T99. |   |  |
| Stone Base   |  | e maximum dry density by ASTM<br>indard Proctor), AASHTO T99.                         |  |

|  | Table 220   | 00.2B   |  |
|--|---|---|--|
| Location   | Density   |   |  |
| Building Structures  |   |   |  |
| Embankment/borrow<br>beneath and within 5<br>feet of buildings,                    | Top 12<br>inches  | 100% of the maximum dry<br>density by ASTM D698<br>(Standard Proctor) |  |
| under foundations,<br>and scarified existing<br>subgrade beneath<br>buildings.     | Up to<br>within 12<br>inches                                      | 95% of the maximum dry density<br>by ASTM D698 (Standard<br>Proctor)  |  |
| Outside structures<br>next to walls and any<br>other structural<br>exterior member | 90% of the maximum dry density by ASTM D698<br>(Standard Proctor) |   |  |
| Backfill less than 10<br>feet from exterior<br>retaining walls                     | 90% of the maximum dry density by ASTM D698<br>(Standard Proctor) |   |  |

D. Failure of compactive efforts: If compaction efforts should fail to provide a stable subgrade in accordance with the requirements in <u>paragraph 3.6 C</u>, <u>Passing Test</u> after subgrade materials have been shaped and brought to optimum moisture, such unstable materials shall be removed to the extent directed by the Geotechnical Engineer and/or the City Engineer and replaced and compacted using new material and must pass compaction test prior to proceeding to the next stage of construction and at no expense to the City.

The costs associated with excavation and re-compaction of areas that have failed will be the Contractors responsibility.

## E. Compaction Lifts:

| Ta                      | able 2200.3                  |
|-------------------------|------------------------------|
| Compactio               | on Lift Thickness of         |
| Lift Thickness (inches) | Location                     |
| 6                       | Inside street rights-of-way  |
| 12                      | Outside street rights-of-way |

F. In-place testing of soils shall be tested based on the following:

|                             | Table 02200.4   |  |
|-----------------------------|---|--|
| In-Place Density Tests      |   |  |
| Soil<br>Type/Classification | Reference Standard  |  |
| GW, GP, GM, GC,<br>SW, SP   | <ul> <li>Sand Cone Method (ASTM D1556)</li> <li>Nuclear Method ASTM D2922)<br/>[by percentage of Standard Proctor Density<br/>according to ASTM D 698]</li> </ul>   |  |
| SM, SC, ML, CL              | <ul> <li>Sand Cone Method (ASTM D1556)</li> <li>Rubber Balloon Method (ASTM D2167)</li> <li>Nuclear Method ASTM D2922)</li> <li>Drive-Tube Method (ASTM D2937)<br/>[by percentage of Standard Proctor Density<br/>according to ASTM D 698]</li> </ul> |  |

# G. Field Testing Limitations:

- When field density testing is incorporated according to <u>Table 02200-1</u>, subgrade adequacy is to be confirmed by proof rolling in the presence of the City Engineer or his representative. In-place field density testing of the street or pad subgrade will not be required.
- 2) In-place field density tests of the roadway or pad subgrade in cut sections (excavation) is not required.
- Testing/adequacy of intermittent undercut areas and repair areas (e.g. around manholes and boxes) that have been backfilled with select fill and compacted will be confirmed by proof rolling.

# 3.7 STRUCTURES: EXCAVATION, FILLING, AND BACKFILLING

#### A. General

See Section 02275 - *Trenching, Backfilling, and Compaction of Utilities* for excavation and backfilling for structures (manholes, catch basins, etc.). See NCDOT *Standard Specifications for Roads and Structures, latest revision* for excavation and backfilling for retaining walls.

B. Protective Measures for Structures

- 1) Drainage: Control grading around structures so that the ground is pitched to prevent water from running into excavated areas or damaging structures. Maintain excavations where foundations, floor slabs, equipment support pads or fill material are to be placed free of water. Provide pumping required, keeping excavated spaces clear of water during construction. Should any water be encountered in the excavation, notify City Engineer. Provide free discharge of water by trenches, wells, or other means as necessary and drain to point of disposal.
- 2) Frost Protection: Do not place foundations, footings, or fill material on frozen ground. When freezing temperatures may be expected, do not excavate to full depth indicated, unless foundations, footings or fill material can be placed immediately after excavation has been completed and approved. Protect excavation from frost if placing of concrete or fill is delayed.
- 3) Protection of Structure: Prevent new and existing structures from becoming damaged due to construction operations or other reasons. For catch basins, provide temporary weep holes with a non-woven filter fabric to relieve hydrostatic pressure on walls.

#### 3.8 RIP RAP AND RIP RAP BEDDING PLACEMENT

Placement of Rip Rap and Rip Rap Bedding shall conform to Section 876 – *Rip Rap* of the NCDOT *Standard Specifications for Roadways and Structures*, latest revision.

## 3.9 PLACEMENT OF SOIL STABILIZATION FABRIC

Placement of soil stabilization fabric shall conform to the requirements of Section 270 – *Fabric for Soil Stabilization* of the NCDOT *Standard Specifications for Roadways and Structures*, latest revision and in accordance with the recommendations and directions of the City Engineer and/or a Geotechnical Engineer for the application and use intended.

#### 3.10 SUBSURFACE DRAINAGE SYSTEMS

See Section 2630 – *Storm Drainage* and Section 02275 – *Trenching, Backfilling, and Compaction of Utilities* for both materials and construction requirements regarding subsurface drainage systems

#### 3.11 METHOD OF VOLUME MEASUREMENT

Contractors are required to furnish accurate counts of all excavation and/or fill moved which is to be paid for under a Contract unit price. The volumes shall be measured by either "truck tally" or by "cross-sectioning," whichever method is approved by the City Engineer or stated in the proposal and/or bid documents. When a truck count is used, the City Engineer or their representative shall verify the count independently.

#### A. Truck Tally Method:

**Excavation**: When unclassified excavation or undercut volumes are to be counted by the truck tally method, "swell" is to be incorporated into the truck volume in the amount of 15%. Unless otherwise agreed to or justified by a

Geotechnical Engineer, the following pay volumes are to be used for either unclassified or undercut excavation:

| Tandem:   | 13 CY |
|-----------|-------|
| Tri-axle: | 15 CY |

**Borrow**: When either off-site or on-site borrow is to be counted by the truck tally method, "shrinkage" is to be incorporated into the truck volume in the amount of 15% (shrinkage of truck volume placed compared to compacted fill volume) utilizing the following pay volumes:

| Tandem:   | 10 CY |
|-----------|-------|
| Tri-axle: | 12 CY |

**Loading Truck**: A qualified truckload is one that is loaded up to within approximately 6" of the top of the dump bed, prior to dumping.

#### B. Average-End-Method:

Excavation and fill can be computed using the average-end-method. When used, this method is to be employed using the existing contours shown on the Contract Drawings and the Contractors actual surveyed finished contours (surveyed by a licensed Professional Surveyor). In so doing, the finished contours are to be plotted at the same scale as the original drawing and a transparency furnished to the Engineer for comparison to design grades. The volume computations are also to be submitted along with the Surveyors seal and a certification as to the volumes measured.

The Contractor, at his discretion and with the prior approval of the Engineer, may survey the "stripped" site (the site after topsoil has been removed) and compute the volumes based on the stripped site and the "designed" finished grade as shown on the Contract Drawings. As before, a transparency to the same scale and the Surveyors computations and certification are to be submitted to the Engineer for comparison and verification.

#### C. Volume Formulas:

Unless otherwise approved, the following formulas are to be used in computing cut and fill:

#### Fill Formula

**Net Fill** = Raw Fill Vol. – Unclassified Excavation X (1 - Shrink Factor) + Strip Vol. - Undercut or waste Fill placed in Fill Slopes X (1 - Shrink Factor) - Pavement Section or Building Floor Pad

#### Cut Formula

Net Cut = Raw Cut - Strip Vol. + Pavement Section or Building Floor Pad

#### 3.12 CLEANUP AND RESTORATION OF SITE

A. 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. Upon completion of grading operations, the Contractor shall fine grade the site, removing all surplus excavated material, leaving the area free from surface irregularities. He 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 the City Engineer. The Contractor may be required to sprinkle the street to prevent dust nuisance and/or sweep the street to remove mud or debris.
- C. When working on the shoulders of paved roads, the Contractor shall keep the pavement clean of all loose earth, dust, mud, grave, etc., and shall restore roadway shoulders and ditches as required by either the NCDOT or the right-of-way owner.
- D. After all work is completed, the Contractor shall remove all tools and other equipment, leaving the site free, clean, and in good condition.
- E. The Contractor shall keep the surface over and along the roadways and other graded areas in a safe and satisfactory condition during the progress of the work.

#### 3.13 SEEDING, SODDING, AND GROUNDCOVER

#### 3.13.1 GENERAL

- A. Seeding, Sodding, and Groundcover shall comply with the applicable provisions and requirements of Section 02920, *Seeding, Sodding and Groundcover*.
- B. 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.

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 in accordance with **Standard Detail 350.01**.

If the construction activity disturbed a landscaped lawn, the seeding shall be modified to restore ground cover comparable to the existing lawn.

C. 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.

- D. **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 and mulching upon completing initial earthwork. Note that the time for establishment of permanent ground cover is 21 calendar days. Temporary seeding shall also be used to stabilize finished grade areas if the time of year is outside the specified permanent seeding periods.
- E. **Stockpile Area**: The Contractor is responsible for securing equipment storage, material lay down, and stockpile storage area for his work. 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 the City and the NCDENR, Department of Water Quality, Land Quality Section. 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.

## 3.14 MISCELLANEOUS

## 3.14.1 DUST CONTROL

The Contractor shall be required to sprinkle with water or to apply dust-allaying materials to ensure that dust is held to an absolute minimum. Dust control is considered incidental and shall be carried out at the Contractor's expense.

#### 3.14.2 SALVAGE OF USEABLE MATERIALS

All materials such as iron castings, paving blocks, brick, pipe and etc., removed during excavation that is useable on this project shall be used after approval of its use by the City 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 Contractors responsibility and the cost of replacement may be deducted from the retainage.

# End of Section 02200

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# 02275 - TRENCHING, BACKFILLING AND COMPACTION OF UTILITIES

(Last revised 8/22/13)

SELECTED LINKS TO SECTIONS WITHIN THIS SPECIFICATION

Part 1- General Part 2 – Products Part 3 – Execution Backfilling Bedding Definitions Bedding for Pipe Blasting Cleanup & Restoration Clearing and Grubbing Common Trench Backfill Compaction – Min Require'ts Def-Common Trench Backfill Def-Select Earth Backfill Dewatering Erosion Control, NPDES Flowable Fill Concrete Foundation Preparation Highway Crossings Minimum Pipe Cover Pavement Repair River & Creek Crossings Rock Excavation Seeding & Groundcover Select Earth Backfill Trench Backfilling Unclassified Trench Excavation

# PART 1 – GENERAL

## 1.1 GENERAL:

A. 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:

- 1) Sanitary Sewer Pipe Installation & appurtenances.
- 2) Water Distribution Pipe Installation & appurtenances.
- 3) Relocation of piping systems.

## 1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this specification.
- B. AWWA C600: Standard for Installation of Ductile-Iron Water Mains and their Appurtenances
- C. AWWA C605: Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings
- D. AWWA C900: Pressure Pipe and Fabricated Fittings (4" through 12") for Water Distribution

- E. City of Wilson Pre-Approved Material/Product List
- F. City of Wilson Right-of-Way Regulations and Procedures, latest edition
- G. Section 00825 Product Substitutions
- H. Section 00950 Measurement and Payment
- I. Section 02530 Sanitary Sewer
- J. Section 02510 Water Distribution
- K. Section 02630 Storm Drainage
- L. Section 02920 Seeding, Sodding, and Groundcover
- M. NCDENR Division of Land Resources, Land Quality Section's Erosion and Sedimentation Control Planning and Design Manual.
- N. Standard 29 CFR Part 1926, OSHA Subpart P "Excavation and Trenching," latest edition.
- O. UNI-PUB-6: Recommended Installation Guide for PVC Solid-Wall Sewer Pipe (4-15 inch)
- P. UNI-PUB-9: Installation Guide for PVC Pressure Pipe

# 1.3 SUMMARY

- A. This section includes:
  - 1) Excavating and backfilling trenches for buried water, sewer, storm drainage, buried utility structures, and appurtenances.
  - Preparing subgrade for buried water and sewer, buried utility structures, and appurtenances.
- B. Construction and materials related to this section but covered elsewhere:
  - 1) Erosion Control: North Carolina Sediment Control Law.

#### 1.4 DEFINITIONS

For the purposes of this specification, the following definitions refer to sanitary sewer, water distribution, and storm drainage systems that come under the authority of the City of Wilson as specified within this section and other sections of this manual.

- A. Backfill: Soil materials used to fill an excavated trench.
  - Initial Backfill (Carefully Compacted Select Earth Backfill): Backfill placed beside and over the top 12-inches of the pipe in a trench, including haunches to support sides of pipe.

2) **Final Backfill** (Common Trench Backfill): Backfill placed over the initial backfill to fill a trench.

In terms of volume, backfill is defined as a compacted post-construction volume in-place.

- B. **Bedding Course**: Layer of clean coarse stone placed over the excavated subgrade in a trench to bring the trench bottom up to grade before laying pipe. When natural materials encountered in trenches are of fine grains and migration of material into the bedding is possible, use well graded bedding material without voids (coarse sand; [Unified Soil Classification System] SC, SM).
- C. Borrow: Borrow shall consist of approved fill material imported from off-site.
- D. City Engineer: The Director of Engineering or his designated representative.
- E. City: Refers to the City of Wilson
- F. Classified Excavation (undercut): Classified 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 fill or stone as ordered by the City Engineer. See also paragraph AA, Unclassified Excavation.
- G. **Clearing**: Clearing shall consist in the felling, cutting up, and satisfactory disposal of trees and other vegetation designated for removal in accordance with these specifications.
- H. **Competent Person**: Competent Person means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.
- I. **Contractor**: Refers to a Contractor licensed in the State of North Carolina to perform public utility construction.
- J. **Easement**: An instrument that depicts/describes and conveys rights and privileges to the City 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.
- K. Force Main: Pressurized sanitary sewer main.
- L. Foundation Stone: Clean well-graded stone, authorized by the City 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. Where voids may cause migration of native or backfill material, use well graded material without voids (coarse sands; [Unified Soil Classification System] SC, SM).

- M. **Grubbing**: Grubbing shall consist of the removal of roots 1 ½ inch and larger, organic matter, debris and stumps and the disposal thereof.
- N. Haunching: Layer of clean coarse stone placed and compacted up to the springline of the pipe. Where voids may cause migration of native or backfill material, use well graded material without voids (coarse sands; [Unified Soils Classification System] SC, SM).
- O. **Public Sanitary Sewer System**: Any sewer facility or line owned and maintained by the City of Wilson.
- P. Rock Excavation for Trenches and Pits: Rock excavation for trenches and pits includes removal and disposal off-site of materials and obstructions encountered that cannot be practically excavated with a track-mounted power excavator equivalent to a Caterpillar Model No. 325 or equivalent equipped with new rock teeth. Practical excavation is defined as the ability to remove at least 30 cubic yards during one hour of continuous digging. Trenches in excess of 10 feet in width and pits in excess of 30 feet in either length or width are classified as open excavation.
- Q. Rock in Open Excavation: All boulder, solid ledges, bedded deposits, unstratified masses, and conglomerations of material so firmly cemented as to possess the characteristics of solid rock. Rock in open excavations includes removal and disposal on-site of materials and obstructions encountered in general excavation other than trenches and pits that cannot be dislodged and excavated with modern, track-mounted, heavy-duty excavating equipment without drilling, blasting, or ripping. Rock is defined as material which cannot be effectively excavated during general grading with a D-8 or equivalent dozer drawing a new single-tooth ripper. Effective excavation is defined as the ability to remove 10 cubic yards or more of material after one hour of continuous ripping. Typical of materials classified as Rock in Open Excavation are boulders larger than 1-1/2 cubic yards or more in volume, solid rock, rock in ledges, and rock-hard cementitious aggregate deposits.
- R. Shall: Means a mandatory requirement.
- S. **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.
- T. **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.
- U. Topsoil: See Division 02920 Seeding, Sodding, and Groundcover.
- V. 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 not be used until all suitable trench excavation material has been placed in the trench, unless authorized by the City Engineer. Unless otherwise designated on the plans and in the contract documents, the Contractor shall make his own arrangements for obtaining borrow and pay all costs involved.

- W. Water Main: Exterior water systems for both domestic water and fire suppression needs.
- X. **Water Distribution ORC**: The City's *Operator in Responsible Charge* over the City of Wilson's water distribution system; a manager in the Water Resources Department.
- Y. The Director of Water Resources: The Director of Water Resources, Water Distribution ORC or their authorized representative.
- Z. **Wastewater Collection ORC**: The City's *Operator in Responsible Charge* over the City of Wilson's wastewater collection system; a manager in the Water Resources Department Division.
- AA. **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. See also paragraph <u>F, Classified Excavation</u>.
- BB. The following are industry abbreviation for various pipe materials:
  - 1) AC: Asbestos Cement Pipe
  - 2) **CAP**: Corrugated Aluminum Pipe
  - 3) CI: Cast Iron Pipe
  - 4) **DIP**: Ductile Iron Pipe
  - 5) **HDPE**: High Density Polyethylene Pipe
  - 6) **PCP**: Plain Concrete Pipe
  - 7) **PVC**: Polyvinyl Chloride Plastic Pipe
  - 8) **RCP**: Reinforced Concrete Pipe.

## 1.5 SUBMITTALS

- A. 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 City 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 the City as "additional Insured." See <u>paragraph 3.8.1 Blasting</u> 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 City officials.
- 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.
- If required by the City Engineer, seismic survey agency report, for record purposes.

#### B. 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 and ASTM E548. Testing Lab to be AMRL (AASHTO Materials Reference Laboratory) and CCRL (Cement and Concrete Reference Laboratory) certified.
- B. Comply with all codes, laws, ordinances, and regulations of governmental authorities having jurisdiction over this part of the work.
- C. The contractor shall comply with North Carolina Department of Environment and Natural Resources, *Erosion and Sedimentation Control Handbook*, latest revisions.
- D. Comply with applicable requirements of NFPA 495, *Explosive Materials Code*, latest revisions.
- E. Gravity Sanitary Sewer Design and Construction, ASCE Manuals and Reports on Engineering Practice – NO. 60, WPCF Manual of Practice NO. FD-5, latest revisions.
- F. Comply with Uni-Bell PVC Pipe Association Handbook of PVC Pipe: Design and Construction, latest edition. Dallas: UNI, 1991 for the installation of PVC piping, latest revisions.

#### 1.7 QUALITY STANDARDS

A. Materials and operations shall comply with the latest revision of the Codes and Standards listed below:

#### American Society for Testing and Materials

- ASTM C33 Concrete Aggregates
- **ASTM D698** Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup>) (Standard Proctor).
- ASTM D1556 Standard Method of Test for Density of Soil in Place by the Sand-Cone Method
- ASTM D1557 Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup>) (Modified Proctor).
- ASTM D2049 Standard Method of Test for Relative Density of Cohesionless Soils
- ASTM D2167 Standard Method of Test for Density of Soil in Place by the Rubber-Balloon Method
- ASTM D2487 Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).
- ASTM D2922 Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- ASTM D3740 Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
- ASTM D4253 Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
- ASTM D4254 Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
- ASTM D4318 Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- ASTM E329 Standard Specification for Agencies Engaged in Construction Inspection and/or Testing
- ASTM E548 Standard Guide for General Criteria Used for Evaluating Laboratory Competence

#### American Association of State Highway & Transportation Officials

AASHTO T99 The Moisture-Density Relations of Soils using a 5.5-pound Rammer and a 12-inch drop.

|    | AASHTO T180                      | The Moisture Density Relations of Soils using a 10-pound Rammer and an 18-inch drop.       |  |
|----|----------------------------------|--|--|
|    | AASHTO M145                      | The Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes. |  |
|    | American Water Works Association |  |  |
|    | AWWA C600                        | Installation of Ductile Iron Water Mains and Their Appurtenances.                          |  |
| Β. | Standard Abbreviatio             | ns:  |  |
|    | AASHTO                           | American Association of State Highway Transportation Officials.                            |  |
|    | ACI                              | American Concrete Institute  |  |
|    | ACPA                             | American Concrete Pipe Association   |  |
|    | ANSI                             | American National Standards Institute  |  |
|    | AREA                             | American Railway Engineers Association   |  |
|    | ASCE                             | American Society of Civil Engineers  |  |
|    | ASTM                             | American Society for Testing and Materials   |  |
|    | AWWA                             | American Water Works Association   |  |
|    | CISPI                            | Cast Iron Soil Pipe Institute  |  |
|    | DWQ                              | Division of Water Quality  |  |
|    | FS                               | Federal Specifications   |  |
|    | MSDS                             | Material Safety Data Sheets  |  |
|    | NCDENR                           | NC Department of Environment and Natural Resources   |  |
|    | NCDOT                            | North Carolina Department of Transportation  |  |
|    | NCMA                             | National Concrete Masonry Association  |  |
|    | NCPI                             | National Clay Pipe Institute   |  |
|    | NSF                              | National Sanitation Federation International   |  |
|    | NPDES                            | National Pollutant Discharge Elimination System  |  |
|    | OSHA                             | Occupational Safety and Health Administration  |  |
|    | WEF                              | Water Environment Federation   |  |

## 1.8 TESTING SERVICES

- A. The testing laboratory shall be approved by the City 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 requirements of the Contract Documents and specifically note any deviation.
- B. 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. Coordinate with applicable utility companies to shut off services if lines are active.
- 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 in that permit. 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. All crossings, disturbances, and encroachments into wetlands shall be subject to US Army COE and NCDENR Division of Water Quality approval and permitting requirements and conditions.
- 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 by NCDENR or other proper authority, 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 minimum, but not necessarily limited to, Best Management Practices in during construction.
  - 1) Woody vegetation is cleared by hand. No grading allowed.
  - 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.
  - Schedule work in buffers to ensure exposure of denuded surface in the buffer is kept to a minimum

# D. Safety

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.

## E. Geotechnical Investigation

- 1) Where a Geotechnical report has been provided to the Contractor by the City of Wilson, the data on sub-surface soil conditions is not intended as a representation or warranty of the continuity of such conditions between borings or indicated sampling locations. It shall be expressly understood that the City of Wilson will not be responsible for any interpretations or conclusions drawn there from by the Contractor. The data is made available for the convenience of the Contractor.
- 2) In addition to any report that may be made available to the Contractor, the Contractor is responsible for performing any other soil investigations felt necessary for proper evaluation of the site for the purposes of planning and/or bidding the project, at no additional cost to the City of Wilson.

## F. Protection of pavement

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. Employ the necessary measures required to meet this requirement.

## 1.10 SERVICE INTERRUPTION

For service interruption, operation of valves, taps, fire hydrant operation, etc, contact the Water Resources Department at 296-3403. Provide a minimum of 48 hours notice or desired utility interruption or necessary operation of valves or hydrants.

# 1.11 COORDINATION

A. Coordinate tie-in to municipal water mains with the City Engineer and/or the Director of Water Resources. Except as needed for fire suppression purposes, the City of Wilson will be the sole operator of all valves and hydrants on the City's water distribution system. When no customers will be affected, the City shall be notified at least 24 hours in advance of a request for the City to operate valves.

Service is to be continuously maintained to customers in the project areas except for the minimum amount of time required to make connections to the existing system. However, if service is to be interrupted by shutting off a main(s), adequate notification to water customers shall be given by the Contractor prior to any interruption of service. Residents are to be notified at least 24 hours in advance of cut off using flyers.

In the case of an emergency, a Contractor or plumber will be permitted to employ measures with respect to valve and fire hydrant operation as required for the protection of life and property. Notification must be made to the City as soon as possible after the emergency occurs stating what the emergency was and the measures taken to mitigate the emergency.

- B. Coordinate tie-ins to municipal roadway system with the City of Wilson.
- C. At the direction of the City Engineer and/or Director of Water Resources, temporary bypass pumping of sewerage flow may be required to be provided. See paragraph 3.6, *Bypass Pumping* of Specification Section 02530 Sanitary Sewer for bypass pumping requirements and procedures.
- D. When traffic signals, loops, or their appurtenances are likely to be damaged or interfere with construction, coordinate temporary operation with the applicable agency having jurisdiction of the signals. Provide a minimum of 1 weeks' notice prior to anticipated disturbance or interruption. At the discretion of the City Engineer, the notice may be required to be published in the newspaper.
- E. **Repair of pavement markings**: When cuts are made through any paved surface and the cuts extend through the pavement markings, the replaced pavement shall be marked to match the existing.
- F. Benchmark/Monument Protection: Protect and maintain benchmarks, monuments or other established reference points and property corners. If disturbed or destroyed, they must be replaced at Contractor's own expense by a Licensed Professional Surveyor and to the full satisfaction of Owner/City of Wilson.
- G. Contact "NC One Call" at 811 before digging.

#### 1.12 PUBLIC CONVENIENCE



The contractor shall at all times so conduct his 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 fire fighting 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 the City Engineer.

#### 1.13 TRAFFIC CONTROL

- A. When working within any NCDOT System road or highway, 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.
- B. 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.
- C. A traffic control plan shall be submitted to the City of Wilson Police Department and NCDOT (if applicable) for approval.
- D. When traffic signals or their appurtenances are likely to be damaged or interfere with construction, coordinate temporary operation with the NCDOT or the City Engineer. Provide a 1 week notice prior to anticipated disturbance or interruption.

E. Whenever it becomes necessary to leave a section of trench open after completion of the days 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.

#### 1.14 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 Land Resources (or approved local program).

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.

2) 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.

- 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.
- 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).
- 5) 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 Quality.

- All erosion and sedimentation control facilities shall be inspected by or under the direction of the permittee (the Owner and his/her Contractor). 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) list<sup>1</sup> for construction related indicators of impairment such as turbidity or sedimentation),
  - b. And 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.

<sup>&</sup>lt;sup>1</sup> The latest approved list may be obtained from the Division of Water Quality, or from the following website location: <u>http://portal.ncdenr.org/c/document\_library/get\_file?uuid=9d45b3b4-d066-4619-82e6-ea8ea0e01930&groupId=38364</u> (This list is periodically updated. Check for updates.).

| Stormwater Discharge<br>Characteristics          | Monitoring<br>Type <sup>1</sup> | Monitoring Location <sup>2</sup> |
|--|---------------------------------|----------------------------------|
| 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:

<sup>1</sup> Monitoring Type: The monitoring requires a qualitative observation of each stormwater outfall. **No analytical testing or sampling is required**. <sup>2</sup> Sample (observation) location: **SDO= S**tormwater **D**ischarge **O**utfall

- 3) The operator (Contractor) shall keep a record of inspections and forward copies of these reports to the City 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 the sediment that has left the disturbed limits shall also be recorded. These records shall also be made available to DWQ or an authorized agent upon request. If the City Engineer or his/her representative 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 the City along with the "red lined" record water and/or sewer drawings.

#### C. Schedule of Compliance

- 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
  - 2.1.1 MATERIAL CLASSIFICATION
    - A. Bedding Material: NCDOT #57 stone. For concrete pipe bedding material, see Standard Detail 631.01.

- B. Excavation: All excavation material shall be classified as either Rock or Unclassified Earth Excavation. Prices bid for the various sizes of pipe shall include excavation and backfilling.
- C. Flowable Fill Concrete Backfill (Controlled Low Strength Material): Concrete strength shall be liquid enough to flow, be self-leveling, excavatable, and have a minimum 28-day compressive strength of 30-psi but not more than 100-psi. 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 chapter 3 of 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.

- D. **Foundation Stone**: Foundation/Trench Stabilization Material: #57 stone. For Concrete Pipe foundation stone, see Standard Detail 631.01.
- E. Select Earth Backfill: 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, Class II or III unless otherwise approved by the City Engineer. Stone screenings meet the intent of this specification.
- F. Common Trench Backfill:
  - Satisfactory Soils: ASTM D2487 soil classification group (Unified Soil Classification System) GW, GP, GM, SW, SM, SC, ML, and CL (Classes IA, IB, II, III and IVA soils; see Standard Detail 511.02) 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.
  - 2) Unsatisfactory soils: ASTM D 2487 soil classification group GC, CH, MH, OH, OL and PT (Classes IVA & V soils; see Standard Detail 511.02); soils which contain rock or gravel larger than 3 inches in any dimension, debris, waste frozen materials, vegetation, clumps of clay larger than 3 inches in any dimension, and other deleterious matter. Unsatisfactory soils also include satisfactory soils not maintained within +/- 3% of optimum moisture content at time of compaction, unless otherwise approved by the City Engineer.
- G. **Structures, Backfill around**: Backfill shall be approved by the City 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. The top 12 inches are to be free of material greater than 1-inch in their greatest dimension. Porous backfill shall be either #67 or #57 clean stone.
- H. **Topsoil**: Topsoil shall consist of friable clay 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. See division 02920 – Seeding, Sodding, and Groundcover.

#### 2.1.2 PIPE BEDDING DEFINITIONS

#### A. Pipe Bedding Definitions (Water & Sewer)

1) Class D Bedding is that condition existing when the ditch is excavated slightly above grade by excavation equipment and cut to finish grade by hand. Bell holes are dug, to prevent point loading the pipe bells, so that pipe bears uniformly upon the trench bottom. Existing soil should be shovel sliced or otherwise compacted under the hunching of the sewer pipe to provide some uniform support. Soil is tamped to 90% of the standard Proctor maximum dry density around the pipe to a point one foot above the pipe. The remainder of the soil to the ground surface is to be compacted to the density specified in <u>Table 2275.3</u>. In poor soils, granular bedding material is generally a more practical, cost effective installation. The bedding factor for class D bedding is 1.1.

A Class D bedding generally equates to a Type 1 Laying Condition as shown on **Standard Detail 511.02**.

2) Class C Bedding is that condition where the sewer pipe is bedded in compacted granular material. The granular bedding has a minimum thickness of one-eighth the outside sewer pipe diameter, but not less than 4 inches or more than 6 inches, and shall extend up the sides of the sewer pipe one-sixth of the pipe outside diameter. The remainder of the sidefills, to a minimum depth of 6 inches over the top of the pipe, consists of lightly compacted backfill. The remainder of the soil to ground surface is to be compacted to the density specified in <u>Table 2275.3</u>. The bedding factor for class C bedding is 1.5.

A Class C bedding is similar to a Type 3 Laying Condition as shown on **Standard Detail 511.02** except that the pipe has a minimum of 4 inches of stone bedding that extends up one-sixth of the pipe OD.

3) **Class B Bedding** is that condition where the sewer pipe is bedded in carefully compacted granular material. The granular bedding has a minimum thickness of one-eighth the outside sewer pipe diameter, but not less than 4 inches or more than 6 inches, between the barrel and the trench bottom, and covering the full width of the trench.

The haunch area of the sewer pipe must be fully supported; therefore, the granular material should be shovel sliced or otherwise compacted under the pipe haunch to the springline of the pipe. Both granular haunching (to the springline) and initial backfill to a minimum depth of 12 inches above the top of the sewer pipe should be placed and compacted. The initial backfill material, to a depth of 12 inches above the top of the pipe, should be compacted to no less than 90% of the standard Proctor maximum dry density. The remainder of the soil to the ground surface is to be compacted to the density specified in <u>Table 2275.3</u>. The bedding factor for class B bedding is 1.9.

A Class B bedding generally equates to a Type 4 Laying Condition as shown on **Standard Detail 511.02** except that the haunches are backfilled with stone up to the springline of the pipe.

4) Class B-1 Bedding (*PVC pipe applications*) is the same as Class B Bedding except that granular backfill is placed to the *top of the pipe* rather than to the springline of the pipe. The remainder of the soil to the ground surface is to be compacted to the density specified in <u>Table</u> <u>2275.3</u>.

A Class B-1 bedding generally equates to a Type 5 Laying Condition as shown on **Standard Detail 511.02**.

5) **Class A Bedding** is that condition when the sewer pipe is bedded in a cast-in-place concrete cradle of either plain or reinforced concrete having a thickness equal to one-fourth the inside pipe diameter, with a minimum of 4 inches and a maximum of 15 inches under the pipe barrel and extending up the sides for a height equal to one-fourth the outside pipe diameter. The cradle width shall have a width at least equal to the outside diameter of the sewer pipe barrel plus 8 inches. The bedding factor for class A bedding is 2.2.

The haunching and initial backfill material above the concrete cradle should be crushed stone or a well graded granular material and carefully compacted to 12 inches above the crown of the sewer pipe. The remainder of the soil to the ground surface is to be compacted to the density specified in <u>Table 2275.3</u>.

#### 2.2 MISCELLANEOUS

#### 2.2.1 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.

- A. **Filter Fabric for Rip Rap**: Filter Fabric for Rip Rap and Rip Rap Beddings shall conform to Section 1056 *Engineering Fabrics* of the NCDOT *Standard Specifications for Roadways and Structures*, latest revision for Type 2 engineering fabric.
- B. **Soil Stabilization Fabric**: Generally, soil stabilization fabric shall conform to the requirements of Section 1056 *Engineering Fabrics* of the NCDOT *Standard Specifications for Roadways and Structures*, latest revision for Type 4 engineering fabric. However, provide fabric meeting Geotechnical Engineers recommendations for the application and use intended.
- C. Fabric for Subsurface Drains: Non-woven needle-punched fabric shall conform to Section 1056 *Engineering Fabrics* of the NCDOT *Standard Specifications for Roadways and Structures*, latest revision for Type 1 engineering fabric.

D. Silt Fence Fabric: Silt fence fabric shall conform to Section 1056 – Engineering Fabrics of the NCDOT Standard Specifications for Roadways and Structures, latest revision for Type 3 engineering fabric, Class A or B as specified or shown on the plans.

# 2.2.2 WARNING TAPE

**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 mils) and be 3 inches wide with black lettering imprinted on a color coded background that conforms to APWA uniform color code specification (BLUE) 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 (or SEWER if a sewer force main) LINE BELOW" repeated along the length of the tape. A detectable warning tape shall be used with all water and sewer mains. Underground warning tape is to be placed 12 to 18 inches above top of pipe. See Standard Detail 511.01.

Standard color code for tape and wire.

| Blue:  | Water Systems     |
|--------|-------------------|
| Green: | Sewer Force Mains |

#### 2.2.3 LOCATOR WIRE:

Number 12 AWG blue insulated single-strand solid or stranded copper locator wire shall be installed above all non-ferrous water and sewer mains; attached every 5 feet to the mains with zip ties. Electrical conductivity along the pipe shall be continuous and uninterrupted between valve boxes. Clamps used to bond wire to conductor to metal (in instances where both PVC and ductile iron are used in the same run of pipe) shall be heavy-duty stainless steel approved by the City Engineer. A sufficient excess length of wire shall be left in each valve box to provide at least a 6 to 12 inches length of wire above finished grade. See **Standard Detail 511.01**.

#### 2.2.4 DEFORMED REINFORCING STEEL

Reinforcing Steel bars shall meet ASTM A615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement, grade 60, latest revision.

#### 2.2.5 WELDED WIRE FABRIC

Welded wire fabric shall meet ASTM A185 Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete, latest revision.

# PART 3 – EXECUTION

#### 3.1 PREPARATION

# 3.1.1 GENERAL REQUIREMENTS APPLYING TO ALL AREAS

- A. Contractor shall plan construction to minimize disturbance to properties adjacent to the water or sewer lines.
- B. The City 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.
- C. 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.
- D. The Contractor shall be responsible for damage to areas or items designated by the City Engineer to be protected. Repairs to, replacement of, or reparations for areas or items damaged shall be made to the satisfaction of the City Engineer and affected property owners before acceptance of the completed project.
- E. The Contractor shall protect all buildings or structures located along the utility line. Hand trenching, shoring, or other methods may be required.
- F. Any fences disturbed by the Contractor shall be repaired to a condition equal to or better than their original condition or to the satisfaction of the City Engineer. This may require the use of new material.
- G. Contractor shall limit width of disturbed area through garden areas to a width absolutely necessary for construction of utility line.
- H. 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.
- I. All areas disturbed shall be restored to a condition equal to or better than their original condition and shall be graded to drain.
- J. The Contractor shall replace or repair all damaged or destroyed hedgerows and property corners using the services of a licensed Professional Surveyor.

# 3.1.2 CONSTRUCTION LIMITS

- A. Contractor shall not disturb any areas outside the limits contained in this section without express written permission from the City Engineer.
- B. 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 the City Engineer shall be final on the determination of which trees are to be cut.
- C. Should it become necessary to move the position of any underground structure, the Contractor may be required to do such work and shall be paid on a "force account" basis or on an "extra work" basis as directed by the City Engineer.

Method of payment shall be agreed upon by the City Engineer and the Contractor prior to commencing work.

- D. If existing utilities are found to interfere with the permanent facilities being constructed under this section, immediately notify the City Engineer and secure instructions. Do not proceed with permanent relocation of utilities until instructions are received from the City Engineer.
- E. 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 the City Engineer.

## F. Specific requirements applying to developed subdivision/lots

- Unless directed otherwise by the City Engineer, all trees, shrubs, hedges, or other ornamental plantings located outside of the construction limits, easements, or public rights-of-way shall be protected by the Contractor. The City Engineer reserves the right to designate certain trees located within the construction limits for protection where deemed desirable.
- 2) The contractor shall protect septic systems or springs located outside the construction limits.
- 3) Excavated or blasted rock shall be removed from the site unless otherwise ordered by the City Engineer.

## G. Specific requirements applying to undeveloped areas

- In wooded areas, the clearing shall be limited to the easement or right-ofway limits unless indicated differently on the City of Wilson approved construction drawings, in which case, the work shall be confined to the limits defined on the plans. All permanent easements and rights-of-way shall be fully cleared as determined by the City Engineer. The City Engineer reserves the right to designate certain tree located within the construction limits for protection where deemed desirable.
- 2) In areas where livestock and pets are 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 and pets protected from open ditches, machinery, blasting, and other hazards.

#### 3.1.3 PROTECTION OF EXISTING UTILITIES AND STRUCTURES

#### A. Subsurface obstructions

 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 48 hours prior to excavation. Contact underground damage protection services NC One Call or current locator service. Secure and examine local utility surveyor records for available location data including building service lines.



- 2) 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, poles, 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/obstruction 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 leaving dead ends in the ground, such ends shall be carefully plugged or bulkheaded by the Contractor at the Contractor's expense and in accordance with the requirements of the affected utility agency. The Contractor shall be responsible for any damage to persons or property caused by such breaks. This includes water taps and sewer cleanouts installed by a contractor during new construction to be taken over by the City of Wilson.
- 3) 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.
- 4) If active utility lines are encountered, and are not shown on the Drawings or otherwise made known to the Contractor, promptly take necessary steps to assure that service is not interrupted.
- 5) Should it become necessary to move the position of any underground structure, when approved by the City Engineer, the Contractor may be required to do such work and shall be paid on a "force account" basis or on an "extra work" basis.
- 6) If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the City Engineer and secure instructions. Do not proceed with permanent relocation of utilities until written instructions are received from the City Engineer.

# B. Protection of Surface Features

 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 his expense to the satisfaction of the City Engineer.

- 2) Where a utility line is placed 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 another jurisdiction other than the City of Wilson or within NCDOT rights of way, the Contractor is responsible for contacting the local representative or NCDOT, respectively about pavement repair/replacement.
- 3) Avoid overloading or surcharge by keeping equipment and material 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.
- 4) Provide full access to public and private premises, to fire hydrants, at street crossings, sidewalks and other points as designated by the City Engineer to prevent serious interruption of travel.
- 5) Protect and maintain benchmarks, monuments, or other established points and reference points, and if disturbed or destroyed, items shall be replaced by a Licensed Professional Surveyor to the full satisfaction of the City Engineer and/or the jurisdictional agency.
- 6) See paragraph 1.11 D, Coordination, regarding traffic signals.

#### C. Procedures for repairing damaged utility services

- 1) 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 the City. Notification shall be made to the Utility owner.
- 2) House services: If a service pipe supplying water or gas to an adjoining house is broken, the Contractor shall repair it at once and at his expense. The City may, at the Contractor's expense, repair any such service without prior notice to the Contractor.
- 3) If damage results from the action of either a public or private party on a newly constructed project to be accepted by the City of Wilson (e.g. water, sanitary sewer, storm sewer, or street), immediate notification shall be given to the City Engineer or City Inspector. All damages or interruption shall be the responsibility of the party causing the damage.

#### 3.1.4 PROTECTION OF PERSONS AND PROPERTY

- A. Barricade open holes and depressions occurring as part of the work, and post warning lights on property adjacent to or part of public access.
- B. 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.

C. **Protection and Restoration of Property:** The contactor shall not enter upon private property for any purpose without first obtaining permission. He shall use every precaution necessary to prevent damage or injury to any public or private property, trees, fences, monuments, and underground structures, etc., on and adjacent to the site of the work. He shall protect carefully from disturbance or damage all land monuments and property markers until an authorized agent has witnessed or otherwise referenced their locations, and shall not remove them until directed.

The Contractor shall be responsible for all damage or injury to property of any character resulting from any act, omission, neglect, or misconduct in his manner or method of executing said work, from his nonexecution of work, or from defective work or materials, and he shall not be released from said responsibility until the work shall have been completed and accepted.

When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work, the contractor shall restore such property, at his own expense, to a condition equal to or better than that existing before such damage or injury was done. The contractor shall make good such damage or injury in an acceptable manner by repairing, rebuilding or otherwise restoring as directed.

The Contractor shall, at his own expense, sustain in their places and protect from direct or indirect injury all pipes, poles, conduits, walls, roadways, buildings, and other structures, utilities and property in the vicinity of his work. Such sustaining and supporting shall be carefully done by the Contractor and as required by the Company or party owning the structures or Agency controlling it. The Contractor shall take all risks attending the presence or proximity of pipes, poles, conduits, walls, thereof and any costs associated will be deducted from any monies due the Contractor. Failure of the City Engineer or his/her authorized representative to direct the correction of unsafe conditions or practices shall not relieve the Contractor of his responsibility hereunder.

# 3.1.5 CLEARING AND GRUBBING

- A. **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 the City 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 the limits of construction.
- B. A preconstruction meeting shall be held with appropriate urban forestry personnel (as may be applicable) and the City prior to any clearing, if required. The City Engineer may require tree protection fencing in sensitive areas, where specifically identified trees are desired to be protected, and when required by the landscape ordinance.
- C. The area within the limits of construction or as designated shall be cleared and grubbed of all trees, stumps, roots, brush, undergrowth, hedges, heavy growth of grasses or weeds, debris and rubbish of any nature that, in the opinion of the

City Engineer, is unsuitable for foundation material. Nonperishable items that are not deleterious to the project and will be a minimum of 5 feet below the finish elevation of the earthwork or slope of the embankment may be left in place.

- D. 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 and 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.
- E. Contractor shall protect existing tress and other vegetation indicated by the City 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.
- F. Carefully and cleanly, cut roots and branches of trees indicated to remain where the roots and branches obstruct construction of the proposed utility line. If directed by the City 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.
- G. If they are damaged by construction operations, trees and vegetation designated to remain shall be repaired or replaced at Contractor's expense in a manner acceptable to the City Engineer. The City Engineer may require that the tree and/or vegetation damage be repaired as directed by a qualified tree surgeon.
- H. 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.
- I. 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.
- A. **Marginal Areas**: In marginal areas, with the City Engineer's permission, remove trees where the following conditions exist.
  - Root Cutting: When clearing up to the "clearing limits," the Contractor shall also remove any tree which is deemed marginal such that when the roots are cut a tree could be rendered unstable by the affects of high winds and thus in danger of toppling into either the right-of-way or onto private property.

- 2) Slender Bending Trees: Where young, tall, thin trees are left unsupported by the clearing operation, and are likely to bend over into the right-of-way, the Contractor, during the clearing operation, shall selectively remove those trees which are located outside and adjacent to the clearing limits and City right-ofway or easement as well. During the course of construction and during the one-year warranty period, the Contractor shall remove such young trees that overhang into the right-of-way or cleared area. Removal outside of a public right-of-way or easement require permission from a private property owner. Coordinate owner contact with the City's inspector.
- J. 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 respread 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 and/or other measures required by the Erosion and Sedimentation Control Plan/Permit.
- K. Disposal: All brush, tree tops, stumps, and debris shall be hauled away from site or otherwise disposed of in a manner acceptable to the City Engineer. The contactor shall clean up debris resulting from clearing operations continuously with the progress of the work and remove promptly all salvageable material that becomes his 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 the City. 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 a NCDENR 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.

#### 3.1.6 DEWATERING

- A. Water in trenches: When ground water in encountered, the contractor shall remove the water that accumulates in the trenches or pits, which would affect the construction of the lines or their appurtenances, 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 sedimentation control laws. Pipe laying and pipe jointing shall be made in the "dry."
- B. Maintain dewatering systems until dewatering is no longer required.
- C. 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 or through the line.

- D. 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 or permission has been otherwise granted by the City Engineer.
- E. The contractor shall dispose of water from the trenches in such a manner to cause no injury to public health, pubic 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 the City Engineer. When required by the City Engineer, a means shall be provided for desilting (filtering) the water before discharge. Under no circumstances shall water be discharged to a sanitary sewer main or structure.
- F. 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.
- G. Do not allow water to accumulate in excavations. Unless otherwise directed by the City Engineer, the cost of shoring, sheeting, well pointing, gravel bedding and other dewatering devices shall be included in the unit price of each respective item bid. Do not use excavated trenches as temporary drainage ditches.
- H. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation. Include cost of de-watering in proposal for water or sewer lines. No additional remuneration for this item is permitted.
- I. Where underground streams or springs are encountered, provide temporary drainage, well pointing, or bailing. Notify the City Engineer of such conditions.
- J. Backfilling shall not take place when the trench contains water in an amount to create soupy conditions.

# 3.2 TRENCH EXCAVATION

#### 3.2.1 GENERAL

- A. 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. Rock excavation shall be paid for as a separate item.
- B. Remove all material of whatever nature, including but not limited to clay, silt, and gravel. Provided the material meets the requirements of paragraph <u>2.1.1</u> <u>Material Classification</u>, subparagraph F, <u>Common Trench Backfill</u>, 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.
- C. **Unsuitable Material and Wasting**: When directed by the Owner's Engineer or the City 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 ordnances regarding permitting of waste site, erosion control, zoning, etc. as may be applicable.

- D. Excavation shall be performed in accordance with OSHA Standard 29 CFR Part 1926, Subpart P Excavations.
- E. Sanitary and Storm Sewer Alignment and Grade: Offset stakes set at each manhole, catch basin, or curb inlet 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, the City Engineer shall approve any change in grade or alignment which deviates from the approved plans.
- F. Concrete collars shall be installed when either shown on the approved plans or directed by the City Engineer.

# 3.2.2 PIPE COVER

- A. **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 the legally constituted authority having jurisdiction, but in no case less than the depth shown in the Contract Documents.
- B. Minimum 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 cover on pipe is measured perpendicular from top of pipe or fittings to original ground or proposed finished grade as applicable and shall be per Table 2275.1, 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.

| Table 2275.1                               |  |  |   |  |
|--|--|--|---|--|
| Minimum Cover Above Top of Main Pipe Lines |  |  |   |  |
|  | Condition  |  |   |  |
| Utility                                    | Subject to vehicular traffic   | NOT subject to vehicular traffic   | With Concrete<br>Encasement   |  |
| Sanitary Sewer                             | 36 <sup>b</sup> inches<br>(use DIP if < 36<br>inches of cover)   | 24 <sup>b</sup> inches<br>(use DIP if < 36<br>inches of cover)   | As Designed   |  |
| Sewer Services                             | At depth shown<br>on plans but no<br>less than 36 <sup>b</sup><br>inches<br>(use DIP if < 36<br>inches of cover) | At depth shown<br>on plans but no<br>less than 12 <sup>b</sup><br>inches                                       | As Designed   |  |
| Water Distribution                         | 36 <sup>ª</sup> inches for<br>lines 8 inches<br>and smaller; 42<br>inches for lines<br>larger than 8<br>inches   | 36 <sup>ª</sup> inches for<br>lines 8 inches<br>and smaller; 42<br>inches for lines<br>larger than 8<br>inches | 24 inches<br>(encasement, if<br>required, shall<br>extend to at least<br>5 feet beyond<br>each side of a<br>ditch or culvert<br>crossing) |  |
| Water services                             | 30 <sup>ª</sup> inches   | 30 <sup>ª</sup> inches   | As Designed   |  |
| Storm Drainage                             | As designed but<br>no less than 12 <sup>c</sup><br>inches for<br>reinforced<br>concrete pipe                     | As designed  | As Designed   |  |

<sup>a</sup>**Minimum/Maximum Cover for Water Pipe**: The City Engineer must approve all installations of water line with less than 30 inches of cover or greater than 72 inches of cover. Lines which have less than 30 inches of cover at ditch or culvert crossings shall be Ductile Iron and encased in a steel casing. The casing shall extend through all areas until the depth of cover above the DIP is greater than 30 inches.

<sup>b</sup>Minimum/Maximum Cover for Sewer Pipe: The City Engineer must approve all installations of sewer lines with 24 inches of cover or less or with greater than 18 feet of cover. Ductile iron pipe is required where depth of pipe exceeds 12 feet or the line is placed in fill.

<sup>c</sup>**Minimum/Maximum Cover for Storm Drainage Pipe**: The City Engineer must approve all installations of storm drainage lines in areas subject to traffic load with less than 12 inches of cover or with greater than 12 feet of cover. The pipe class, trench width, and/or the bedding class shall be modified for the depths exceeding 12 feet of cover to accommodate the extra depth/loads. Pipe subject to vehicular traffic shall be reinforced concrete pipe. No plain concrete pipe is permitted in traffic areas.

C. Water lines which have less than 30 inches of cover at ditch or culvert crossings shall be required by the City Engineer to be encased. The casing shall extend through all areas until the depth of cover above the DIP is greater than 30 inches.

#### 3.2.3 TRENCHING

A. General: The trench for gravity pipe shall be excavated to conform to Standard Details 511.02 (water and sewer pipe embedment), 631.01 (storm drainage), and **731.01** (sewer) as applicable. Where it is necessary to remove existing pavement, 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. If necessary due to damage, edges of existing pavement shall be re-cut and trimmed to square, straight edges after the pipe system has been installed and prior to placement of the new base and pavement. See **Standard Detail C01.03**.

All trenching shall be open-cut from the surface. No tunneling or boring will be allowed without the consent of the City 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 of offset recommended by the pipe manufacturer.

1) 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 transverse to the pipe at the top of the pipe. The sides of the trenches shall be vertical unless otherwise approved by the City Engineer. Unless otherwise shown in the standard details, 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. 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" walk behind or infrared remote controlled trench roller/compactor (24- to 33-inch drum).

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 (1/2inch) 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. No extra compensation shall be allowed for this work unless such excavations are ordered by the City Engineer.

- 2) Trench Depth:
  - a. General: All trenches shall be excavated to accommodate the bedding as shown in Standard Details 511.01, 511.02, (water and sewer), 631.01 (storm drainage), and 731.01 (sanitary sewer) as applicable. No extra compensation will be made for stone bedding used to bring the trench up to grade other than that required in Standard Detail C01.02 where yielding or wet subgrade is encountered.
  - b. Water: Trench depth shall generally conform to that shown on the plans and in conformity to the requirements of <u>Table 2275.1</u>, *Minimum 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 <u>Table 2275.1</u>, *Minimum Cover above top of Main Pipe Lines*.
  - d. **Storm drainage**: Excavate to the depth and grades shown on the plans. Trench depth shall generally conform to the requirements of <u>Table 2275.1</u>, *Minimum Cover above top of Main Pipe Lines*.
- 3) 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 he 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 unless approved otherwise by the City Engineer, 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 the City Engineer. Schedule work and order materials so that trenches are not left open for a longer period than is reasonably necessary. If the contractor should fail to heed the aforementioned requirement, the City Engineer may refuse payment until these conditions are complied with.
- 4) Containment of Sediment (solids and mud): The contractor shall at all times so conduct his 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 City system in order to trap material for the Contractor's removal and City'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.

# 3.2.4 SHEETING AND BRACING, TRENCH BOXES

# A Certified Competent Person designated by the Contractor shall be on-site at all times excavation or pipe installation is being conducted.

Provided there is no indication of a potential cave-in, trench walls may generally have vertical sides if less than 5 feet in depth (measured from subgrade elevation to existing grade). In excess of 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 in full observation of the requirements of OSHA *Subpart P – Excavations*. Trench wall slopes and/or benching shall conform to the requirements of OSHA based on Soil Classification (Stable Rock, type A, B, or C type) and account for trench depth, surcharge loads, stored equipment or material, traffic, etc. When trenches are 4 feet or more in depth, a safe means of egress (stairway, ladder, ramp or other safe means) from the trench excavations shall be provided. Such egress shall be placed so that no more than 25 feet of lateral travel by employees is required to the egress.

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 the stage that no damage to piping, utility service, or conduit will result due to removal of sheeting. All shoring and form material shall be removed before backfilling. 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 the City 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 the City 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.

#### 3.2.5 ROCK:

- A. Rock Excavation: See paragraph <u>1.4 P, Rock Excavation for Trenches and Pits</u> and paragraph 1.4 Q, Rock in Open Excavations for definition of rock excavation.
- B. When rock is encountered in the trench, the City Engineer must be notified before any rock is blasted or removed. Do not perform rock excavation work until rock has been cross-sectioned, classified, and approved for removal by the City Engineer. The City 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 <u>paragraph 3.8</u>, <u>Blasting</u> for other requirements regarding rock excavation.

- C. Intermittent drilling, blasting, or ripping performed to increase production and not necessary to permit excavation of material encountered will be deemed to be unclassified excavation
- D. All overblasted rock which has been loosened must be removed prior to backfilling.
- E. The Contractor must use overburden, mats, or other means to minimize flyrock. Any damage caused by flyrock or excessive vibration will be the responsibility of the Contractor.
- F. **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 sand or soil (select earth) 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. Thicker cushioning may be required for deeper pipe on a case-by-case basis. See Standard Detail C01.01.
- G. **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 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 the City.

# 3.2.6 PREPARATION OF FOUNDATION FOR PIPE LAYING

A. Excavation of trenches for all pipes lines shall be done to line and grade as established by the design 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, sewer, or storm drainage line.

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.

Excavation in Class II, III, or IV soils shall be made to grade to provide undisturbed bedding in accordance with AWWA C600. (See <u>Standard Detail</u> <u>511.02</u>, <u>sheets 2 & 3</u> for classification definitions.)

B. Unsuitable Trench Subgrade/Foundation Improvement: Excavation in Class V, wet, yielding, unstable, inadequately supporting, or mucky soils shall be excavated 6 inches or more below the specified grade. The material shall be removed for the full width of the trench and the excavated area strengthened for foundation purposes. The over excavated material shall be replaced with

thoroughly compacted Class I, II, or III materials as directed by the City Engineer. The trench bottom shall provide a stable and continuous support for the pipe system with bell holes provided to permit jointing. See **Standard Detail C01.02**.

Whenever the bottom of the trench is such that it cannot be reasonably stabilized, the City Engineer may require the utility to be laid in a concrete mud mat, concrete encasement, cradles, in cradles supported on piles, or a combination of these materials. When necessary, the Contractor shall provide for the temporary diversion of water in order to maintain the pipe foundation in a dry condition.

Observe the following requirements when unstable trench bottom materials are encountered:

- 1) Notify the City when unstable materials are encountered and define by drawing station locations and limits when encountered.
- 2) Remove unstable trench bottom materials as directed and replace with subgrade stabilization material specified.
- B. Over-excavation: Unauthorized over-excavation consists of removal of material beyond indicated subgrade elevations or side dimensions, without specific approval of the City 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.

## 3.2.7 TRENCH PREPARATION FOR PIPE

# A. Preparation of trenches for Gravity Sewer pipelines

The bottom of the trench for gravity pipelines shall be excavated to a minimum over depth as shown on **Standard Detail 731.01** 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 3 inches deep (see **Standard Detail C01.01** and paragraph <u>3.2.5 F</u>, above). 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 be only of such length, depth, and width as required for properly making the particular type of joint. The trench for gravity sewers and lateral connections shall then be backfilled and compacted as indicated in <u>Table 2275.3</u>.

# B. Preparation of Trenches for Storm Drainage Pipelines

The bottom of the trench for storm drainage pipelines shall be excavated to a minimum over depth as shown on the construction drawings in accordance with the applicable type laying condition specified (as shown on **Standard Detail 631.01**) to provide for pipe bedding for the entire length of the gravity pipeline, including lateral connections if any, except in rock where foundation bedding

shall be prepared as specified on **Standard Detail 631.01**. Unless otherwise directed by the City Engineer, the bedding shall be shaped to conform to **Standard Detail 631.01**. Bell holes and depressions as required of the joint shall be dug after the bedding has been graded and shaped, and shall be only of such length, depth, and width as required for properly making the particular type of joint. Rock larger than 3 inches shall be removed from the trench bottom and any voids filled with compacted NCDOT Class II or III material. The trench for storm drainage and lateral connections, if any, shall then be backfilled and compacted as indicated **Standard Detail 631.01**, **Table 2** taking care to compact in no more than 8-inch lifts with the fill brought up evenly on both sides of the pipe at the same time to avoid unbalanced pressures. The balance of the trench backfill up to pavement subgrade, or finished grade as applicable, shall conform to <u>Table 2275.3</u> of this specification.

Where an unsuitable foundation is encountered, provide a stone foundation with NCDOT Type 4 soil stabilization fabric as shown on **Standard Detail 631.01**.

#### C. Preparation of trenches for Water Mains and 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 <u>Table 2275.1</u>. 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 3 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 6 inches below pipe and the void filled with coarse sand (SC, SM).

Unless directed otherwise by the City Engineer, DIP water mains and force mains shall have a <u>Type 1</u> laying condition with <u>Class D bedding</u>. Bedding for DIP water mains shall conform to <u>Standard Details 511.01</u> and 511.02 as applicable. PVC water main pipe bedding shall conform to <u>Standard Detail</u> 731.01. (See also <u>paragraph 2.1.2, Bedding Definitions</u>)

#### D. 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. 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 <u>paragraph 3.1.6</u> – <u>Dewatering</u>, of this specification.

The open end of water or sewer 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.

Storm drainage pipe shall either be plugged and/or an appropriate sediment trap placed at the upstream end to prevent siltation.

#### 3.2.8 TRENCHING IN FILL

In areas where trenching for pipe will be in fill, the fill 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.

### 3.2.9 SUBSURFACE DRAINAGE

Installation of subsurface drainage systems shall conform to the requirements of Section 815 – *Subsurface Drainage* of the NCDOT *Standard Specifications for Roadways and Structures* 

#### 3.2.10 EXCAVATION FOR STRUCTURES

- A. Excavate to provide a minimum of 12 inches of horizontal clearance between outer surface of structure and trench wall.
- B. 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.

# **3.2.11 WATER MAIN BEND BLOCKING INSTALLATION**

- A. Excavate area to receive poured-in-place concrete blocking to exact dimensions shown in Standard Detail 512.01. 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 the City Engineer for directions.
- B. Concrete shall be plain concrete with a minimum compressive strength of 3000 psi at 28 days.
- C. Wrap bolts in plastic or provide other acceptable means of protection, approved by the City Engineer before pouring concrete blocking.

#### 3.2.12 DEPOSITION OF EXCAVATED MATERIAL

A. All excavated material shall be placed on one side of the trench (a minimum of 2 feet from the edge of excavation but no less that that specified/required by OSHA regulations) away from the roadway unless permission is given by the City'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 to in such a way 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 or better condition as before it was disturbed. Protect shade trees from stockpiling of material.

- B. 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.
- C. Wasting of Unsuitable Material: 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. 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 the City. If additional material is required, the contractor shall supply same from an approved borrow pit at no additional cost to the City. Rock excavated from the trench shall be hauled off the site at the Contactor's expense.

#### 3.3 BEDDING

- **3.3.1 BEDDING DEFINITIONS**: see <u>paragraph 2.1.2</u>, *Pipe Bedding Definitions* (Water & Sewer).
- **3.3.2 MINIMUM BEDDING REQUIREMENTS** (by utility type):
  - A. Sewer Pipe Bedding: Unless otherwise noted below, provide #57 or smaller stone trench bedding material.
    - Minimum Bedding Allowed DIP Gravity Pipe: Minimum Type 4 Laying Condition (Standard Detail 511.02). The minimum bedding depth shall be 3 to 4 inches under the pipe with an additional 1 inch depth of cushioning material added for each additional 2 feet of depth in excess of 16 feet up to a maximum of 12 inches of cushioning material.
    - 2) Haunching DIP Gravity Pipe: The remainder of bedding for DIP shall be brought up to a depth of 1/8 the OD of the pipe. However, when the foundation is determined by the City Engineer or his representative to be unsuitable, the pipe shall be bedded to the spring line of the pipe. See Standard Detail 511.02, Type 4 laying condition.
    - 3) Bedding and Haunching SDR 35 PVC and C900 PVC Gravity Pipe: PVC pipe to have Type 5 laying condition (Standard Detail 511.02) with the remainder of bedding shall be brought to the top of pipe. The minimum bedding depth shall be 3 to 4 inches under the pipe with an additional 1 inch depth of cushioning material added for each additional 2 feet of depth in excess of 16 feet up to a maximum of 12 inches of cushioning material. See also Standard Detail 731.01.
    - 4) Minimum Bedding Allowed for DIP and C900 PVC Force Mains: Bedding for DIP force mains shall be Type 1 Laying Condition with excavation of trench bottom for bells as shown on Standard Detail 511.02. Bedding for C900 PVC force mains shall be Type 5 laying Condition as shown on Standard Detail 511.02.

- 5) Minimum Bedding Allowed for PVC Services: Bedding for PVC services shall be Type 5 laying Condition as shown on Standard Detail 511.02 except the total trench width may no less than 24 inches.
- D. Bedding Water Pipe and Water Service Pipe: Unless otherwise directed by the City Engineer, do not bed water pipe and water service pipe in stone. DIP water mains to be Type 1 Laying Condition with excavation of trench for bottom of bells as shown on Standard Detail 511.02. Bedding for C900 PVC water mains shall be Type 4 laying Condition as shown on Standard Detail 511.02.
- E. Bedding in Rock: For rock areas, bed pipe in accordance with paragraph <u>3.2.5 B Cushioning pipe in rock</u> and Standard Detail C01.01.
- F. Bedding for Storm Drainage Pipe: See paragraph 3.2.7.B, above.
- G. Bedding for Structures: The bottom of manhole bases and other precast structures and appurtenances shall be excavated to minimum over depth of 6 inches, but no less than as indicated in the applicable standard details, below the bottom of the structure. The structures shall be placed on 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.

# 3.3.3 BEDDING MATERIAL PLACEMENT

A. Unless otherwise specified, the bottom of the pipe trench for sanitary sewer (gravity and pressure), and where indicated by the City Engineer, storm drainage pipe shall be excavated to below the bottom of the pipe, to provide for the compacted bedding materials, except as specified in rock. Bedding material shall be placed, shaped, and compacted so that at least the bottom of the pipe rests uniformly upon the material for the entire length of the pipe. 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 ensure bedding fills the voids beneath the pipe haunches, by poking with a shovel or tamper. See Standard Details 511.01, 511.02, 631.01, and 731.01, as applicable.

#### 3.4 BACKFILLING (MATERIALS AND METHODS)

#### 3.4.1 BACKFILLING

#### A. GENERAL:

- Materials: See <u>paragraph 2.1.1 Material Classification</u> for Select Earth Backfill and Common Trench Backfill classification. In areas of extensive rock excavation, where there is a shortage of suitable backfill, the contractor shall, at his own expense, haul suitable material in to be placed over the pipe.
- 2) Pipe and fittings shall be inspected before backfilling.

- 3) Except as otherwise specified or directed for special conditions, backfill trenches to the ground surface with <u>Common Trench Backfill</u> material approved by the City Engineer. After the pipe has been brought to grade on a proper foundation, earth fill shall be placed carefully about the pipe and tamped properly to hold the pipe in position. Exercise extreme care in backfilling operations to avoid displacing joints and appurtenances or causing any horizontal or vertical misalignment, separation, or distortion. Repair damages, distortions, or misalignments to the full satisfaction of the City Engineer. Pipe shall be removed if broken or damaged during installation. Backfill shall closely follow the pipe installation. Unless otherwise directed or permitted by the City 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.
- 4) 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 the City Engineer.
- 5) 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 given, refill and compact as specified, all at no additional cost to the City.
- 6) Observe specific pipe manufacturer's recommendations regarding methods of backfilling and compaction.
- 7) Ensure compaction of each lift to requirements stated in these specifications.
- 8) All pipe areas shall be graded and maintained in such a condition that erosion or saturation will not damage the pipe bed or backfill.
- 9) Heavy equipment shall not be operated over any pipe until it has been properly backfilled and compacted with a vibratory compaction device (i.e. Rammax walk behind or infrared remote controlled trench roller/compactor (24- to 33-inch drum), NOT A PLATE TAMP) 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 the City.
- 10) Installation of Warning Tape: See paragraph <u>3.17.2</u>, Identification of <u>Water Lines</u> for installation requirements. See paragraph <u>2.2.2</u> Warning <u>Tape</u> for product specifications.

#### B. METHODS:

Provide backfill and compaction methods of following types:

 <u>Carefully Compacted SELECT EARTH BACKFILL</u>: 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 <u>Select Earth Backfill</u>. Comply with the following:

Care shall be taken to prevent any disturbance of 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.

Sheeting 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.

- a. Unless otherwise approved by the City Engineer, place backfill in lifts not exceeding 6 inches (loose thickness).
- b. Hand place, shovel slice, and hand tamp carefully compacted backfill solidly around pipe. Only hand tamping shall be used to compact earth around the pipeline. When the backfill has been brought to 12 inches above the top of the barrel, vibratory compaction devices (i.e. Rammax Trench Compactor walk behind or infrared remote controlled trench roller/compactor (24- to 33-inch drum), NOT A PLATE TAMP) shall be used to compact the remainder of the soil.
- <u>COMMON TRENCH (FINAL) BACKFILL</u> Perform remaining backfill in accordance with drawings or as directed by the City Engineer. See paragraph 2.1 *Soil, Bedding, and Backfill* for definition of <u>Common Trench</u> <u>Backfill</u>. Comply with the following:
  - a. Unless otherwise specified or approved by the City Engineer, backfill the remainder of the trench, from 12 inches above the pipe to grade, with clean earth fill free of stones larger than 3 inches in diameter. Top 12 inches to be free of material greater than 1 inch. Material shall be free from all perishable and objectionable materials (organic). Before placing any backfill, all rubbish, forms, blocks, wires, or other unsuitable material shall be removed from excavation. The backfilling shall be placed in layers not over 6 inches thick in the street right of way and 12-inch layers outside of the street right of way. See <u>Table 2275.4</u>. Final backfill shall be tamped with a vibratory compaction device (i.e. Rammax Trench Compactor walk behind or infrared remote controlled trench roller/compactor (24- to 33-inch drum), NOT A PLATE TAMP). See <u>Table 02275.3</u> below, for specific density requirements.
  - b. 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.
    - 1. Finish subgrade areas that are to receive topsoil. Bring such areas to within 0.10 foot of required subgrade elevations.

- 2. Shape subgrade under sidewalks to line, grade, and crosssection. Subgrade is to be brought to within 0.10 foot of required subgrade elevations.
- 3. Shape subgrade under pavement to line, grade, and crosssection. Bring to within ½ inch of required subgrade elevations.
- c. Surface Protection Traffic: The contractor shall protect newly graded areas from traffic and erosion, 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.

On City funded projects, should <u>the contractor fail to maintain any</u> <u>trench within 2 days after notice from the City Engineer, the City may</u> <u>address/remediate the trench problem and the cost of such work may</u> <u>be retained from monies due the contractor. In case of emergency,</u> <u>the City Engineer may refill any dangerous trench failures or</u> <u>depressions without prior notice to the Contractor.</u>

3) <u>Structure Backfill</u>: Backfill placed within 2 feet of manholes and other special structures shall be of the same quality as that specified for backfill around water, sewer or storm drainage 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 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. Power driven hand tampers shall be used for compacting materials adjacent to structures. Use hand tamper for recompaction over underground utilities.

#### A. Testing

Testing of backfill shall be performed by an independent laboratory approved by the City and the Contractor. The Contractor shall be responsible for excavation for testing.

#### Quality Assurance vs. Quality Control:

Quality Assurance (QA) testing, and the associated cost, is the responsibility of the City. Quality Assurance testing by the City is used to confirm that the Contractor is generally performing his/her work in compliance with these specifications.

Quality Control (QC) testing is the necessary and required testing that is to be performed by the Contractor to assure that he/she is meeting and complying 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 the City when the City's test results (tests for Quality Assurance) results in a "failure."

Quality Control (QC) testing for City funded projects: The City shall pay for the cost of Quality Control by having the Contractor include the cost for testing in the unit cost of the project; not as a separate pay item. The Contractor shall pay for all costs associated with re-testing.

#### B. Quality Assurance (QA):

In the course of backfilling trenches for utility installations, the City Engineer may require "Field Density Determinations" or compaction tests. When compaction tests are called for, the City Engineer will determine the location of the tests and the City shall engage a qualified testing firm to perform the test. A representative of the City will observe tests and a copy of the test results and inspection report will be submitted by the testing firm directly to the City Engineer. When the tests indicate that the density failed to meet the requirements of <u>Table 2275.3</u>, the Contractor shall comply with <u>paragraph 3.5 G</u>, Failure of Compactive Efforts.

**Payment for failed QA density tests**: For City funded projects, payment for failed in-place density tests shall be made by the Contractor by deducting the testing cost from the forthcoming retainage. For other projects in which the City will ultimately assume ownership and maintenance, the testing costs for failed in-place density tests shall be billed directly to the Contractor.

- C. Quality Control (QC): The Contractor shall perform in-field density tests in accordance with <u>Table 02275.2</u>. Inspection reports shall be submitted by the testing firm directly to the City Engineer. See <u>paragraph 3.6 F, Passing Test</u>.
  - 1) All test results shall be provided to the City Engineer as they become available from the testing agency.
  - The Geotechnical testing firm is to perform laboratory tests (ASTM D698, standard Proctor) to establish a moisture-density relationship for all materials that are proposed to be used as fill.
  - 3) Contractor shall give a 24-hour notice to Geotechnical testing firm for subgrade testing, subgrade confirmation, or inspections.
  - 4) Minimum Compaction Testing Frequency:

The following testing frequency shall be employed on both City funded projects and projects proposed to be turned over to the City for maintenance and/or ownership.

|                                | Table 2275.2<br>Testing Frequency   |
|--------------------------------|---|
| Location                       | Frequency   |
| Trench areas in road crossings | 1 test group <sup>a</sup> per road crossing, and/or   |
| Trench areas                   | 1 test per 200 linear feet per two feet of fill thickness   |
|                                | equired to determine the extent of unacceptable compaction<br>y the initial QA/QC test). In this case, the costs for these<br>onsibility of the Contractor. |

<sup>a</sup>One test group consists of a compaction test on each layer of backfill material in the trench segment.

- D. Site access for testing: Ensure the City, 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:** Compaction percentages are percentages of maximum dry density as determined by indicated ASTM Standards. Unless noted otherwise on drawings or more stringently by other sections of these specifications, place and ensure degree of compaction of trench backfill and/or borrow material does not fall below the following percentages of the maximum density at optimum moisture content.

| Table 2275.3<br>Minimum Compaction Limits                          |   |   |  |  |
|--|---|---|--|--|
| (Cohesive Soils)   |   |   |  |  |
| Beneath and<br>within 5 feet of<br>buildings                       | 100% of the maximum dry density by ASTM D698 (standard Proctor), AASHTO T-99. |   |  |  |
| Areas under<br>roadway<br>pavement                                 | Top 12 inches   | 100% of the maximum dry<br>density by ASTM D698 (standard<br>Proctor), AASHTO T-99. |  |  |
| surfaces, curb<br>and gutter, and<br>sidewalks                     | Up to within 12 inches  | 95% of the maximum dry density<br>by ASTM D698 (standard<br>Proctor), AASHTO T-99.  |  |  |
| Roadway<br>shoulders   | 95% of the maximum dry density by ASTM D698 (standard Proctor), AASHTO T-99.  |   |  |  |
| Under turf,<br>sodded, planted,<br>or seeded non-<br>traffic areas |   | num dry density by ASTM D698  |  |  |

F. Passing Test: Average of 3 test results meeting the applicable provisions of <u>Table 2275.3</u> (above) with no one test failing by more than -3 percentage points. Moisture content tolerance is to be within +/- 3 percentage points of the optimum moisture content unless otherwise specified by the City Engineer or Geotechnical Engineer. G. Failure of compactive efforts: If compaction efforts should fail to provide a stable subgrade in accordance with the requirements in <u>paragraph 3.5 F</u>, <u>Passing Test</u> after subgrade materials have been shaped and brought to optimum moisture, such unstable materials shall be removed to the extent directed by the Geotechnical Engineer and/or the City Engineer and replaced and compacted using new material and must pass compaction test prior to proceeding to the next stage of construction and at no expense to the City.

The costs associated with excavation and re-compaction of areas that have failed will be the Contractors responsibility.

#### H. Compaction Lifts:

| The second s | able 2275.4                  |  |
|--|------------------------------|--|
| Compaction Lift Thickness  |                              |  |
| Lift Thickness (inches)  | Location                     |  |
| 6  | Inside street rights-of-way  |  |
| 12   | Outside street rights-of-way |  |

I. In-place testing of soils shall be tested based on the following:

| Table 02275.5  |  |  |  |  |
|--|--|--|--|--|
| In-Place Density Tests Soil Type/Classification Reference Standard |  |  |  |  |
| Crushed Rock   | ASTM D2049 by percentage of relative density<br>ASTM D1557 or D698 (standard Proctor)                                    |  |  |  |
| GW, GP, SW and SP  | ASTM D2049 by percentage of relative density<br>ASTM D1557 or D698 (standard Proctor)                                    |  |  |  |
| GM, GC, SM, SC, ML, CL   | ASTM D2167, D1556, D2922, or D2937 by<br>percentage of standard Proctor Density according<br>to ASTM D698 or AASHTO T-99 |  |  |  |

## 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 36 inches.

Lateral connection trenches in non-paved areas shall be buried as specified for gravity sewers and for water lines, as applicable. See <u>Table 2275.1</u>.

Do not bed water service pipe, except when rock is encountered.

B. Directional Boring or Punching: At the direction of the City Engineer, service pipes may be required to be "punched" or "directionally bored" beneath the pavement.

#### 3.7 PAVEMENT REPAIR AND REPLACEMENT

A. General: This work shall consist of replacing subbase stone, and bituminous material in the street in areas where it becomes necessary to remove the original

pavement for sewer, water main, and storm drainage trenches. Pavement repair shall be as shown on the drawings or as determined by the City Engineer. However, the pavement surface repair shall conform to the minimum requirements shown on **Standard Detail C01.03**. The pavement patch shall provide a uniform and smooth driving surface free of humps or depressions.

B. **Construction in Public Rights of Way**: Water, sewer, and storm drainage lines installed in or across NCDOT roads shall be installed in accordance with, if applicable, the requirements stipulated in the approved encroachment permit and the latest requirements of both the NCDOT *Standard Specifications for Roads and Structures* and the *Roadway Standard Drawings*. All water, sewer and storm drainage lines installed in or across City streets shall be in accordance with these specifications and the applicable standard details.

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 the City or the NCDOT, as applicable. Unless specified more stringently by the owner of the right of way, the backfill shall be compacted in accordance with Table 2275.3.

Contractor shall replace pavement base such that there is a minimum of 36 inches of compacted stone screenings immediately below the proposed pavement surface compacted to 100% of the maximum dry density (ASTM D698). Pavement shall be S-9.5B and shall match the existing asphalt depth but may be no less than 2 inches in thickness. All patches greater than 2 inches in thickness shall be placed in appropriate lifts. See **Standard Detail C01.03**.

- C. When water, sewer and/or storm drainage lines are installed in or across roadways that have been macadamized or graveled, the Contractor shall save the gravel or stone, 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 the City. Maintain area as outlined in paragraph <u>3.4.1 C Surface Protection Traffic</u>.
- D. Cutting Pavement: See also Standard Detail C01.03 and paragraph <u>3.1.3 B</u> <u>Protection of Surface Features</u>. Perform cutting operations prior to installation of line to avoid excessive removal of asphalt.
- E. **Protection of Pavement**: See paragraph <u>3.1.3 B Protection of Surface</u> <u>Features</u>.

#### 3.8 BLASTING

#### 3.8.1 GENERAL

A. 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*, NCDOT Rules for Transporting Explosives, and local Fire Department Regulations. Prior to any blasting, a blasting permit shall be obtained. The approval of the City Engineer and Fire Marshall shall be obtained before any blasting takes place and the City Engineer may fix the hours of blasting if he/she deems 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.

- B. Rock Excavation: See paragraph 3.2.5 Rock for the definition of rock.
- C. The minimum insurance coverage for blasting shall be as specified by current NC Fire Prevention Code or more as determined by the City Engineer and Fire Marshall. 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."
- D. 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. Detonators shall be stored separately from explosives. 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.
- E. The City may prohibit blasting when the method of detonation or the means of protection provided is inadequate. Blasting conducted with or without direct supervision of the City will not relieve the Contractor of the responsibilities stipulated herein.
- F. 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.
- G. 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.
- H. 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.

## 3.8.2 BLASTING PROCEDURE

A. 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 five 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 the City Engineer and Fire Marshall. The signs shall list the blast warning signal system, the Contractor Superintendent's name and telephone number, and the City's representative's name and telephone number.

- B. 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 No. 325 or equivalent and the feasibility of rock excavation by "hoe ramming" (see paragraph 1.4 P, above for definition of <u>rock excavation in open trenches and</u> <u>pits</u>). If these procedures do not offer reasonable production for rock excavation, then blasting will be allowed unless otherwise indicated.
- C. The Contractor shall notify in writing all property Owners within 250 feet of the proposed blast at least 1 week prior to the proposed blast and verbally on the day of the scheduled blast.
- D. 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 the City daily.
- E. The use of unconfined explosives shall be prohibited.
- F. 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.
- G. 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 his liability.
- H. The peak overpressure of air blast shall not exceed 0.015 pound per square inch or 138 decibels.
- Preblast meetings shall be scheduled with the City Engineer and Fire Marshall 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.
- J. Preblast and post blast surveys shall be performed by the Contractor. The Contractor may review this data and supplement it as he sees fit or conduct separate survey after written permission is obtained from the property Owners. In this event, the written permission shall be submitted to the City Engineer and Fire Marshall prior to entering upon private property. The preblast and post blast surveys will include all occupied buildings within 250 feet of blasting areas. The Contractor is strongly encouraged to have a representative present during these surveys. The preblast and post blast surveys performed by the City or the property owner in no way relieve the Contractor of his liability.

K. The City reserves the right to monitor production blasting. In this event, the Contractor shall provide the City Engineer and Fire Marshall ample notice of scheduled blasts (minimum of 24 hours) to allow set-up of monitoring equipment.

# 3.9 HIGHWAY CROSSING

- A. 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 constructed as shown on Standard Detail C07.03. The ductile iron carrier pipe shall be as specified for sewer and water pipe and shall be mechanical joint ductile iron pipe. If, in the opinion of the Contractor, boring and jacking of the highway crossing is not possible due to rock, he shall test drill, in the presence of the City 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 City 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 flowable fill concrete to the bottom of the pavement base course and the pavement restored within one day of placing the pipe.
- B. The steel casing pipe shall be of the thickness as specified in Standard Detail C07.03. Refer to specification Division 02530, Sanitary Sewer and Section 02510, Water Distribution for casing pipe specifications.
- C. Installation shall be in accordance with AREA.
- D. 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 the City Engineer, at his own expense, casing pipe damaged during the jacking operation.
- E. 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 C07.03**.
- F. 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, sewer or storm drainage 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, sewer, and storm drainage 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

In accordance with the contract drawings, 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 the requirements of the City Engineer, NCDENR, The US Army Corps of Engineers, and all other agencies having jurisdiction. Unless horizontal directional drilling is specified in the 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 steam bottom, except during removal of the cofferdam. The contractor shall be advised that the level in the river can fluctuate rapidly.
  - 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 propose 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 3.16 – Seeding and Groundcover.
  - 4) Comply with all terms and conditions of all permits issued by the US Army Corps of Engineers and/or NCDENR 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 Division 02510, *Water Distribution* for installation, testing and other requirements for horizontal directional drilling.

## 3.12 SURFACE/SUBSURFACE WATER CROSSINGS

Surface water crossings, with pipe above the water, shall be adequately supported by pipe support piers or beams. Subsurface water crossings, with pipe under the streambed, shall have the pipe encased in concrete or steel when the cover is less than 3 feet. For subsurface water main stream crossings, see **Standard Details C07.04 and C07.05** for additional limitations on cover and for other requirements relating to stream subsurface stream crossings.

# 3.13 CONCRETE COLLARS ON SEWER MAINS

Concrete collars shall be used on sewer lines with slopes 10% or greater. When concrete collars are specified or shown on the drawings, at least one concrete collar shall be placed before the bell of each joint of pipe. Additional collars may be required by the City.

# 3.14 PLACEMENT OF RIP RAP AND RIP RAP BEDDING

Placement of Rip Rap and fabric shall conform to Section 876 – *Rip Rap* of the NCDOT *Standard Specifications for Roadways and Structures*, latest revision.

#### 3.15 CLEANUP AND RESTORATION OF SITE

- A. 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. 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. He 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 the City Engineer. The contractor may be required to flush or sprinkle the street to prevent dust nuisance.
- C. 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 rock(s) and other debris.

- E. After all work is completed, the contractor shall remove all tools and other equipment, leaving the site free, clean, and in good condition.
- F. 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 competed. He shall be held responsible for any accidents that may occur on the account of the defective condition of such surface.

## 3.16 SEEDING & GROUNDCOVER

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. Seeding, Sodding, and Groundcover shall comply with the applicable provisions and requirements of Division 02920, Seeding, Sodding and Groundcover.
- B. 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.

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 in accordance with **Standard Detail 350.01**.

C. 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.

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 in accordance with **Standard Detail 350.01**.

If the line is installed through a landscaped lawn, sod shall be placed to restore ground cover to the existing lawn.

D. 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 and shall be in accordance with Sediment and Erosion Control regulations.

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.

- E. **Temporary Seeding**: Denuded areas to be graded during the construction phases that are not to be brought to final grade within 21 calendar days shall receive temporary seeding and mulching. Areas to be stabilized with permanent vegetation must be seeded or planted within 15 working days or 90 calendar days after final grade is reached, unless temporary stabilization is applied. Temporary seeding shall also be used to stabilize finished grade areas if the time of year is outside the specified permanent seeding periods.
- F. **Stockpile Area**: The contractor is responsible for securing a material lay down and stockpile storage area for this contract. 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 the City of Wilson and the NCDENR, Department of Water Quality, Land Quality Section. 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.

# 3.17 MISCELLANEOUS

## 3.17.1 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 the City Engineer, it is necessary to ensure that dust is held to an absolute minimum. Dust control is considered incidental and shall be carried out at the Contractor's expense.

# 3.17.2 IDENTIFICATION OF NEW WATER LINES & FORCE MAINS

#### Underground Warning Tape

For all pipe, a metallic warning tape shall be placed 12 to 18 inches directly above the top of the pipe. See **Standard Detail 511.01**.

The metallic warning tape shall be per <u>paragraph 2.2.2</u>, <u>Warning Tape</u> of this specification. No separate payment will be made for warning tape as it is considered to be incidental to the cost of construction of the line being installed.

# 3.17.3 FLOWABLE FILL CONCRETE BACKFILL

When directed by the City Engineer, the Contractor shall backfill trenches or undercut areas with flowable fill concrete plant mix. To allow for future reexcavation of filled area, concrete strength shall be liquid enough to flow, be selfleveling, 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. Depending on depth, a settlement of 2" to 3" is to be expected.

#### 3.17.4 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 only be reused after approval of its use by the City 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 Contractors responsibility for replacement at Contractors expense.

End of Section 02275

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# 02400 - CURB & GUTTER, DRIVEWAYS & SIDEWALKS

(Last Revised 4/23/12)

# SELECTED LINKS TO SECTIONS WITHIN THIS SPECIFICATION

Part 1- General Part 2 – Products Part 3 - Execution Admixtures Brick Sidewalk Construction Concrete Concrete Sidewalk Construction Coordination of Pours Curing Curb and Gutter Decorative D/W, S/W, etc. Driveways Finishing Flumes & Ditches Forms Herbicides for Bikeways <u>Joint Sealer</u> <u>Reinforcement</u> <u>Testing</u> <u>Retaining Walls</u> <u>Washout Handling</u> <u>Welded Wire Fabric</u>

# PART 1 – GENERAL

# 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this specification.
- B. Section 00825 Product Substitutions
- C. Section 00950 Measurement and Payment
- D. Section 02200 Earthwork
- E. Section 02275 Trenching, Backfilling, and Compaction of Utilities
- F. Section 02920 Seeding, Sodding, and Groundcover
- G. City of Wilson List of Approved Manufacturers and Products

## 1.2 SUMMARY

This section includes concrete curbs, combination curb and gutters, ramps, sidewalks, driveways, flumes, valley gutters, median strips, islands, retaining walls, steps, and headwalls on municipal roadways and its appurtenances.

# 1.3 DEFINITIONS

#### A. General:

For the purposes of this specification, the following definitions refer to the streets and roadway system that comes under the authority of the City of Wilson, North Carolina as specified within this section and other sections of this manual.

- Aggregate Base Course: A layer of graded aggregate materials of a specified thickness placed between the subgrade and the concrete structure or appurtenance.
- 2) **Public Road System**: Roadway, streets, and their appurtenances required for the conveyance of the motoring public that are maintained by either the City of Wilson or the North Carolina Department of Transportation.
- Subgrade: The top surface of a sidewalk, curb and gutter or driveway shaped to conform to the typical section on which the concrete structure or appurtenance is constructed.
- Suitable Subgrade: A subgrade that consists of a material type and density that is approved by the City Engineer for placement of a subsequent concrete structure or appurtenance.
- B. The following are industry abbreviations for various materials and items:
  - 1) **C&G**: Concrete Curb and Gutter
  - 2) **D/W** Driveway
  - 3) S/W Sidewalk
  - 4) **WWF**: Welded Wire Fabric

# 1.4 SUBMITTALS

- A. Submit product data, reports, and/or shop drawings, as applicable, for the following:
  - 1) Air Entrainment
  - 2) Concrete cylinder break tests
  - 3) Concrete admixtures
  - 4) Joint Sealants and expansion joint material
  - 5) Job mix formula
  - 6) Other embedded items

# 1.5 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 and ASTM E548.
- B. Comply with all codes, laws, ordinances, and regulations of governmental authorities having jurisdiction over this part of the work.
- C. The Contractor shall comply with North Carolina Department of Environment and Natural Resources, "Erosion and Sedimentation Control Handbook," latest revision.
- D. Materials and operations shall comply with the latest revision of the Codes and Standards listed below:

## American Society for Testing and Materials

Standard Specification for Steel Wire, Plain, for Concrete **ASTM A82** Reinforcement **ASTM A185** Standard for Specification Steel Welded Wire Reinforcement, Plain, for Concrete **ASTM A497** Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete **ASTM A615** Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement ASTM C33 Standard Specification for Concrete Aggregates ASTM C94 Standard Specification for Ready-Mixed Concrete Standard Test Method for Sieve Analysis of Fine and **ASTM C136** Coarse Aggregates **ASTM C150** Standard Specification for Portland Cement ASTM C171 Standard Specification for Sheet Materials for Curing Concrete ASTM C260 Standard Specification for Air-Entraining Admixtures for Concrete **ASTM C309** Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete. ASTM C494 Standard Specification for Chemical Admixtures for Concrete **ASTM C1116** Standard Specification for Fiber-Reinforced Concrete and Shotcrete **ASTM C1315** Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete **ASTM D422** Standard Test Method for Particle-Size Analysis of Soils (for classification purposes only) **ASTM D448** Standard Classification for Sizes of Aggregate for Road and Bridge Construction **ASTM D1751** Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types) **ASTM D1752** Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

- ASTM D3740 Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
- ASTM D4397 Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications
- ASTM E329 Standard Specification for Agencies Engaged in Construction Inspection and/or Testing
- ASTM E548 Standard Guide for General Criteria Used for Evaluating Laboratory Competence
- ASTM E1745 Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs

# American Association of State Highway & Transportation Officials

- AASHTO M145 The Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes.
- AASHTO T99 The Moisture-Density Relations of Soils using a 5.5-pound Rammer and a 12-inch drop
- AASHTO T180 The Moisture Density Relations of Soils using a 10-pound Rammer and an 18-inch drop.
- AASHTO T191 Density of Soil In-Place by the Sand-Cone Method
- AASHTO T204 Density of Soil In-Place by the Drive Cylinder Method
- AASHTO T205 Density of Soil In-Place by the Rubber-Balloon Method

# 1.6 STANDARD ABBREVIATIONS

ACI American Concrete Institute ADA Americans with Disabilities Act ANSI American National Standards Institute ASCE American Society of Civil Engineers American Association of State Highway Transportation AASHTO Officials. ASTM American Society for Testing and Materials CRSI Concrete Reinforcing Steel Institute FS Federal Specifications Material Safety Data Sheets MSDS

**NCDOT** North Carolina Department of Transportation

Note: Designations such as ASTM, AASHTO, NCDOT, etc. referenced through out this specification imply the latest revision.

# 1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

#### A. Concrete Handling/Transportation

- 1) Cement concrete plant operations shall comply with the applicable sections of NCDOT *Standard Specifications for Roads and Structures*, Section 1000, *Portland Cement Concrete Production and Delivery*.
- 2) Time limitations and intervals between deliveries shall be in accordance with Section 1000-4E, *Elapsed Time for Placing Concrete* of the NCDOT *Standard Specifications for Roads and Structures.*
- 3) See Part 3 EXECUTION of these specifications for handling of materials during placement of hydraulic cement concrete.
- B. Steel Handling/Examination:
  - 1) Steel Reinforcing Inspection:
    - a. Plain Steel Reinforcing: Inspect materials thoroughly upon arrival. Examine materials for damage or excessive rust. Remove damaged or rejected materials from site. A light coat of rust is permitted to develop on steel bars and fabric; however, rust scaling and flaking is not permitted
    - b. Coated Steel Reinforcing: Handling and storage of coated bars shall conform to the requirements of AASHTO M284. Visible damage to the coating shall be patched or repaired with materials compatible to the existing coating in accordance with AASHTO M284.
  - Pre-Installation Inspection: Prior to being installed, inspect each bar of steel reinforcing for the presence of dirt, paint, oil, rust scaling, flaking or other foreign matter. Remove such matter with appropriate methods and to the satisfaction of the City Engineer.
- C. Observe manufacturer's directions for delivery and storage of materials and accessories.
- D. Reinforcing steel shall be stored on platforms, skids, or other supports that will keep the steel above ground, well drained, and protected against deformation. Upon delivery to site, epoxy coated steel shall be covered with an opaque covering. Coverings shall be placed to provide air circulation and prevent condensation.

# 1.8 PROJECT CONDITIONS

# 1.8.1 PROTECTION OF STREAMS

Do not discharge excess concrete into a drainage pipe, catchbasin, ditch, stream, river, pond, or lake.

## 1.8.2 PROTECTION OF ROADWAYS

Do not discharge or allow concrete to spill onto any roadway or appurtenances either during placement or while in transit. Remove spills immediately or otherwise repair street as directed by the City Engineer.

## 1.8.3 PROTECTION FROM GRAFFITI:

Newly poured concrete roads, streets, curbs, or sidewalks shall be protected AND guarded from graffiti from passersby until the concrete has sufficiently cured to resist such molestation. Failure to prevent graffiti, or other such vandalism, shall result in the new concrete having to be removed and replaced. This requirement shall mandate the Contractor to take the necessary steps in preventing such incidents including, but not limited, to guarding the project after normal working hours.

## 1.8.4 WASHOUT HANDLING

A concrete washout shall be identified and preapproved for use. The area shall be maintained and restored prior to acceptance of the project.

## 1.9 COORDINATION

Coordinate placement of sidewalk and driveway connections to municipal streets and roadways with the City of Wilson City Engineer.

# PART 2 – PRODUCTS

#### 2.1 MISCELLANEOUS

## 2.1.1 PORTLAND CEMENT CONCRETE

Ready mixed concrete shall comply with ASTM C94, *Standard Specification for Ready-Mixed Concrete*. Cement concrete shall meet the requirements of Section 1000, *Portland Cement Concrete Production and Delivery* and Section 1024, *Materials for Portland Cement Concrete* of the NCDOT Standard Specifications for Roads and Structures. Concrete strength shall be as specified on Standard Details and drawings. Unless otherwise specified, all concrete shall be Class A (3000 psi), minimum.

All exposed concrete shall be air entrained with an air content conforming to the requirements of Section 1000-4B, *Air Entrainment* of the NCDOT *Standard Specifications for Roads and Structures.* Air entrained admixtures for use in Portland cement concrete shall meet the requirements of AASHTO designation M-154, *Air-Entraining Admixtures for Concrete.* Only those admixtures shall be used which have been approved by the City Engineer.

If approved by the City Engineer, calcium chloride may be used as an admixture subject to the requirements of Section 1000-4H, *Use of Calcium Chloride* of the NCDOT *Standard Specifications for Roads and Structures*. Calcium chloride shall conform to AASHTO M144, Calcium Chloride, type 2. Do not use calcium chloride in reinforced concrete construction.

Concrete admixtures, when specified, shall conform to Section 1024-3, *Admixtures* of NCDOT *Standard Specifications for Roads and Structures*.

Concrete Classes (NCDOT) to Design Compressive Strength at 28 days (f'c):

| Class    | Minimum Compressive<br>Strength at 28 days (psi) |  |
|----------|--|--|
| Class AA | 4,500  |  |
| Class A  | 3,000  |  |
| Class B  | 2,500  |  |

## 2.1.2 HANDRAILS

Handrails shall conform to the applicable sections and requirements of Section 460, *Bridge Railing* of the NCDOT *Standard Specifications for Roads and Structures*, latest revision. Handrails for trail projects shall comply with the applicable subsections of Section 1074, *Miscellaneous Metals and Hardware* of the NCDOT *Standard Specifications for Roads and Structures*.

## 2.1.3 JOINT FILLER

#### A. ASPHALT EXPANSION JOINT FILLER

Material shall be approximately ½ inch in thickness and a width and depth equal to those of the incidental structure. However, unless otherwise directed by the City Engineer, install expansion joint filler 1/2-inch below the concrete surface and seal for maximum protection from water infiltration, weathering and to assure proper performance. See paragraph 2.1.11 for concrete joint sealer requirements.

Asphalt expansion joint filler material shall be in accordance with the applicable sections of Section 1028 of the NCDOT *Standard Specifications for Roads and Structures.* Fiber expansion joint filler shall meet AASHTO M213, *Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types);* ASTM D1751, *Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types);* Field Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types), ; Fed Spec item HH-F-341 F, Type I; FAA Spec Item P-610-2.7.

#### 2.1.4 CURING MATERIALS

Liquid membrane curing compound, PE film, burlap, or water for curing shall meet the requirements of Section 1026, *Curing Agents* of the NCDOT *Standard Specifications for Roads and Structures*.

## 2.1.5 INSULATION BLANKET

In cold weather operations, insulated blankets must retain or supply moisture and maintain the temperature at the outermost surfaces of concrete above 50° F for at least 72 hours and above 32° F for at least an additional 48 hours. For other measures pertaining to placing concrete in cold weather, see Section 420-7, *Placing Concrete in Cold Weather* of the NCDOT *Standard Specifications for Roads and Structures*.

## 2.1.6 POROUS BACKFILL AND WEEP HOLES

Porous backfill material and drainpipes for weep holes for retaining walls shall conform to requirements of Section 420-11, *Drains in Walls and Culverts* of the NCDOT *Standard Specifications for Roads and Structures*.

## 2.1.7 PORTLAND CEMENT

Type I, CSA normal, ASTM C150 Standard Specification for Portland Cement.

## 2.1.8 REINFORCEMENT

## A. REINFORCING BARS

Steel reinforcing bars shall be minimum grade 60 and shall conform to the requirements of AASHTO M31, *Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcing and ASTM A615.* Reinforcing bars shall also conform to the applicable requirements of Section 1070, *Reinforcing Steel*, of the NCDOT *Standard Specifications for Roads and Structures.* 

#### B. WELDED WIRE FABRIC

Welded wire mesh shall be of the size specified by the City Engineer but shall be minimum 6 x 6, W2.9 x W2.9 and shall conform to the requirements of AASHTO M32, *Cold-Drawn Steel Wire for Concrete Reinforcement* and the applicable sections of Section 1070, *Reinforcing Steel* of NCDOT *Standard Specifications for Roads and Structures*.

## 2.1.9 AGGREGATE BASE MATERIAL

Aggregate base materials for foundation support shall be #57, compacted, and in compliance with Table 1005-1, *Aggregate Gradation, Coarse Aggregate* of the NCDOT *Standard Specifications for Roads and Structures*.

#### 2.1.10 CONCRETE ADMIXTURES

Concrete admixtures, when specified by the City Engineer, shall conform to Section 1024-3, *Admixtures* of NCDOT *Standard Specifications for Roads and Structures*.

## 2.1.11 CONCRETE JOINT SEALER

Hot applied joint sealer shall be a rubberized/asphalt project meeting ASTM D6690, *Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.* Hot applied Joint sealer is not to be used in areas of a heavy pedestrian traffic. For pedestrian traffic areas, use low modulus silicone sealant meeting ASTM D5893, *Standard Specification for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements.* 

# PART 3 – EXECUTION

## 3.1 CONSTRUCTION – ALL CONCRETE ITEMS

#### 3.1.1 CONSTRUCTION OF SUBGRADE

A. **SUBGRADE PREPARATION**: Excavation and subgrade preparation shall be in strict compliance with Section 02200, *Earthwork*. The subgrade upon which this work is to be placed shall be shaped and compacted to a firm, even surface conforming to the elevation and cross-sections shown on the plans, the standard drawings, or as directed by the Engineer. All soft, frozen, and unsuitable material shall be removed and replaced with approved material. The subgrade shall be moist when the concrete is placed.

## B. BICYCLE/GREENWAY SUBGRADE:

- Pavement subgrade should be prepared in accordance with paragraph 3.1.1 A, above and shall conform to the grade and cross-section shown on the plans.
- 2) Herbicides shall conform to Section 1060-13, *Herbicides* of the NCDOT Specifications for Roads and Structures, latest revision shall be applied to the aggregate base course and/or subgrade immediately prior to paving. The rate of application shall be as recommended by the herbicide manufacturer. <u>Herbicides shall not be left uncovered for longer than 15</u> <u>minutes</u>. Herbicides shall not be used where they may contaminate water used for irrigation or drinking purposes.
- C. **SUBGRADE FINE GRADING (Trimming)**: When forms have been set to exact grade and secured, fine grading to exact sub-grade elevation shall be completed by hand. Before pouring operations begin, the Contractor shall have forms set and grade tested and approved by the Contractor ahead of pouring operations. Subgrade fine grading shall be the responsibility of the Contractor to ensure that the subgrade conforms to the Standard Details.

## 3.1.2 FORMS

A. **GENERAL**: Forms for this work shall be of wood (except curb and gutter), metal, or other approved material, shall extend to the full depth of the concrete and shall be straight, free from warps and of sufficient strength to withstand the pressure of the concrete without springing. Bracing and staking of the forms shall be such that the forms will remain in both horizontal and vertical alignment until their removal. Forms shall be cleaned of foreign matter and oiled before concrete is placed. No concrete shall be poured into forms which have not been checked and approved.

## 3.1.3 PLACING- ALL CONCRETE ITEMS

The concrete shall be placed in the forms in such a manner as to prevent the segregation of the mortar and the aggregate. The concrete shall be spaded, tamped, or vibrated sufficiently to bring the mortar to the surface. Concrete shall not be dropped a distance of more than 5 feet.

Prior to and during pouring operations, the Contractor's foreman or formsetter shall carefully watch all alignment and grades to detect any errors in grade or misalignment. In the event any of the work is damaged from any cause or prove defective in any way, or is out of alignment or grade, the Contractor shall remove such work and replace at his own expense. The detection of poor subgrade shall also be his responsibility.

When sufficient concrete has been placed in the forms, it shall be well spaded along all areas in contact with the forms in order to eliminate all honeycombing. Mix shall be rodded or vibrated to eliminate voids. Concrete shall be floated to the proper grade and alignment, free from depressions or other irregularities, after which the exposed surfaces shall then be screeded with a straight edge and finished with a steel or wooden trowel. The concrete shall be troweled smooth and, before the concrete obtains full set, very lightly brushed with a brush moistened with clear water. No mortar shall be used in the finishing. Immediately following finishing operations, the finished concrete shall be cured and protected in accordance with these specifications.

## 3.1.4 COORDINATION OF POURS

It will be the responsibility of the Contractor to coordinate the times of pours with the Inspector. Sufficient notice shall be given to the Inspector so that he/she can check all aspects of the work before the pouring operations begin. Under no circumstances shall the Contractor pour concrete until the Inspector has had sufficient time to make checks of the work. An inspection shall be requested at least 4 hours prior to any pouring operation.

The maximum interval between the placing of batches at the work site shall not exceed 20 minutes. See also Section 1000-4E, *Elapsed Time for Placing Concrete* and Table 1000-2 of the NCDOT *Standard Specifications for Roads and Structures*.

## 3.1.5 FINISHING

Concrete for curb, curb and gutter, sidewalks and driveways shall have a broomed finish. This finish shall be accomplished as follows: the surface shall be screeded and tamped to force the course aggregate away from the surface, floated to bring the surface to the required finish level, steel-troweled to an even smooth surface and broomed with a fiber-bristle brush. The surface shall be uniform in texture.

## 3.1.6 CURING

## A. CURING - YEAR AROUND

Curing shall be accomplished by preventing loss of moisture, rapid temperature change, and mechanical injury from rain or flowing water for a period of 3 days when normal Portland cement has been used or 7 days when pozzolan mix designs are used. Curing shall be started as soon as placing, finishing, and free water has disappeared from the surface of the concrete. One of the following methods of curing are required year round:

 Liquid membrane compound: Apply membrane-curing compound for curing, sealing, and moisture retention. The entire exposed surface of the structure shall be sprayed uniformly with a white pigmented membraneforming compound immediately following the texturing operation. The curing compound shall be applied in 2 coats by hand.

Do not expose newly placed concrete for more than 30 minutes before being covered with curing compound. Failure to cover the surfaces of the concrete shall be cause for immediate suspension of the paving operations.

Perform application in accordance with manufacturer's directions but at a minimum rate of 100 to 150 square feet per gallon and not more than 350 square feet per gallon (total for both coats). Application shall be by a sprayer or long-nap roller and shall be an even, continuous membrane produced on the concrete surface. The second coat shall be applied in a direction approximately at right angles to the direction of the first coat. No puddling shall be produced. At the time of use, the compound shall be in a thoroughly mixed condition, with pigment uniformly dispersed through the vehicle. The compound shall form a uniform, continuous, coherent film that will not check, crack or peel and shall be free from pinholes or other imperfections.

The membrane shall harden 30 minutes after application. Personnel and equipment shall be kept off the freshly applied material to prevent damage to the seal. Concrete surfaces to which membrane-curing compounds have been applied shall be adequately protected for 7 days from pedestrian and vehicular traffic and from any other action witch might disrupt the continuity of the membrane. If the membrane becomes damaged within the initial 72 hours, damaged portions shall be repaired immediately with additional compound.

If removal of forms is required, exposed sections shall be protected immediately to provide a curing treatment equal to that provided for the surface.

2) PE Film: Spread the section of the film in a manner that will not damage the finished pavement surface. Securely tape or provide lap joints for the sections that are at least 12 inches wide and take suitable precautions to prevent the circulation of air beneath the film. Use black or dark plastic sheets when the daily high ambient temperature is between 40°F - 60°F. Use white opaque reflective plastic sheet when the daily ambient temperature is above 60°F. Plastic sheets shall meet the requirements of ASTM C171, Standard Specification for Sheet Materials for Curing Concrete.

Check the film for damage when it is spread and during the curing period. Repair or replace any damaged section immediately.

## B. COLD WEATHER CURING

No concrete is to be poured when the outside ambient temperature is  $40^{\circ}$  F and falling. Cold weather curing shall be applied when the outside temperature is  $50^{\circ}$  F and falling. When the temperature falls to or below  $35^{\circ}$  F, no concrete work of any kind is to be performed.

- Concrete Temperature: Conform to the requirements of paragraph 420-7, Placing Concrete in Cold Weather of the NCDOT Standard Specifications for Roads and Structures, for the required temperatures of concrete.
- 2) Cold subgrade: No concrete is to be placed on a frozen subgrade.
- 3) In addition to year round curing, install insulated blankets that will retain or supply moisture and maintain the temperature of concrete at the outermost surfaces above 50° F for at least 72 hours and above 32° F for at least an additional 48 hours. Blankets shall be left in place for a minimum of 7 days.
- 4) In cold weather applications, calcium chloride may be used as an admixture, if approved by the City Engineer, provided the concrete is not reinforced.

## C. HOT WEATHER CURING

Hot weather curing shall be applied when the outside temperature is 75°F and rising. Care shall be taken in hot, dry, or windy weather to protect the concrete from shrinkage cracking by applying at a minimum liquid membrane compound and PE film as described in <u>Section 3.1.6 A</u>, above.

Routine hot weather measures shall include cooling forms and wetting subgrade in addition to any of the other measures.

Other measures for curing may be required by the City Engineer, such as: fog spraying, sprinkling, ponding, windbreaks, shading, or wet covering with an approved light colored material. Such curing may be required to remain in place for a minimum of 7 days. No extra compensation will be made for curing of concrete.

#### D. DAMAGED CONCRETE

Any work damaged due to improper curing, freezing, or rain, shall be replaced at the Contractor's expense.

## 3.1.7 PROTECTION OF CONCRETE

A. Protect new concrete sidewalks and appurtenances from pedestrian traffic for a minimum of 24 hours and do not open to pedestrian traffic for the first 5 days. Vehicular traffic shall be excluded for the first 14 days or until the minimum design compressive strength is attained, whichever is the lesser time.

Protect new concrete driveway surfaces and curb and gutter from vehicular traffic for minimum of 7 days or until the minimum design compressive strength is attained, whichever is the lesser time, unless otherwise approved by the City

Engineer. Erect and maintain warning signs, lights, and watchmen to protect pedestrian and to direct traffic as needed.

- B. Protect concrete against public traffic, construction equipment and traffic caused by employees and agents. Repair or replace parts of concrete damaged from such prior to final acceptance.
- C. No equipment shall be driven or moved across newly concreted surfaces unless such equipment is rubber-tired and only if paved surface is designed for and capable of sustaining loads to be imposed by the equipment.
- D. Protect concrete from graffiti.

## 3.1.8 TESTING

A. Testing:

On a case-by-case basis, at the discretion of the City Engineer, the Contractor may be required to perform concrete testing in accordance with the following provisions.

- 1) **Initial Test**: The initial test (from first ready mix truck) is to be taken after the second yard is dispatched from the mixer and is to consist of the following:
  - a. One slump test
  - b. Pull, prepare and store 3 cylinders on-site for 24 hours
  - c. Temperature
- 2) **Second Test**: After the above tests are pulled from the initial truck, every 5th truck thereafter is to be tested in the same manner as noted above.
- 3) Subsequent Test: Slump tests may be required at any time during the pour if for any reason the City Representative or Contractor feels the conditions of the concrete have changed. If the slump test fails, test cylinders of that section shall be taken by the Contractor.
- 4) The City Engineer shall require any concrete that fails to meet the required compressive strength to be removed from any portion of a sidewalk, curb & gutter or driveway and that it be replaced at the Contractor's expense.
- 5) Testing Costs: The cost of Quality Control (QC) tests, tests to assure the Contractor that he/she is meeting and complying with the requirements of these specifications, is the Contractor's responsibility. The cost of Quality Assurance (QA) tests, tests performed independently by the City of Wilson to confirm that the Contractor is generally performing his/her work in compliance with these specifications, is the responsibility of the City of Wilson.

## 3.1.9 DEFECTIVE WORK

The City will require the removal and replacement of any concrete items where they have structural cracks, have been broken, chipped, have become misaligned, grades are incorrect, does not meet dimensions as shown in the Standard Details, improperly cured, or of a substandard or non-approved product. Such areas designated by the City Engineer shall be repaired at no cost to the City. Items replaced shall conform to the requirements for new work as to strength and construction. During removal of defective work, an amount equal to the required lengths of construction joints must be removed and replaced.

Both public and private paving jobs shall have cracked or defective curb replaced prior to paving.

The Engineer may drill cores from completed slabs of concrete to make depth measurements. Sections showing a deficiency of more than 3/8 inch shall be removed and replaced to the specified depth at the Contractor's expense.

#### 3.1.10 CONCRETE CLASS

Concrete class for combined curb and gutter, curbs, sidewalks, driveways, flumes, ditches, steps, headwalls, and islands shall be a minimum of A, 3000 psi or as designated in the specifications or drawings. However, machined formed curb Class AA (4500 psi) is recommended

## 3.2 STANDARD CONCRETE CURB AND GUTTER

#### 3.2.1 GENERAL REQUIREMENTS

This work shall consist of a single course of Portland cement concrete, constructed on a prepared subgrade in accordance with these specifications. It shall have the dimensions, cross-section, and location as shown on the plans or as directed by the City Engineer. See **Standard Detail 402.01** for standard vertical curb & gutter and roll curb.

Horizontal alignment of curbs and combined curb and gutter shall be in reasonably close conformity to the lines shown on the plans. Vertical alignment shall not exceed +/- 3/8 inch in 10 feet from plan grade.

Before concrete obtains full set, all exposed surfaces shall be finished with a brush moistened with clear water.

When constructing curb and gutter, the Contractor will be responsible for filling and compacting material in the space left behind the curb and gutter after the forms are removed. This shall take place within 3 to 7 days from pour and the material shall be compacted to the grade of the back of the curb. No extra compensation shall be made for this work.

Dowels shall be placed in the throat plate, to tie gutter to plate as required in the use of conventional forms.

#### A. JOINTS FOR CURB AND GUTTER:

1) Transverse joints:

- a. Transverse joints for crack control for fixed forms shall be provided at the following locations:
  - 1. At approximately 10 foot intervals;
  - 2. At the gutter where the curb and gutter ties to the gutter apron of drop inlets;
  - 3. When time elapsing between consecutive concrete placements exceeds 45 minutes, and
  - 4. Where no section shall be less than 6 feet in length.
- b. Transverse joints for crack control may be formed by using one of the following methods:
  - 1. Removable 1/8 inch thick templates.
  - 2. Scoring or sawing for a depth of not less than 3/4 inch when using curb machine.
  - 3. Approved "leave-in" type insert or may be formed or created using other approved methods which will successfully induce and control the location and shape of the transverse cracks.
  - 4. Place a joint sealant in cracks after removal of templates. Fill joints in gutter with joint sealer to the top surface of the gutter. Seal all joints except for joints in curb sections not having an integral gutter. Joints are to be sealed before backfilling or performing adjacent operations. See paragraph <u>2.1.11, Concrete Joint Sealer</u> for material spec.

If templates are used for transverse joints, templates shall be removed by stages, but not entirely until the concrete has become thoroughly hard. After removal of the templates, there must be a clear division throughout between these sections. Edging tools will be used to form an edge along the back and front form and at each template.

- 2) Expansion joints:
  - a. See Section 2 PRODUCTS of these specifications for approved expansion materials.

Expansion joints shall be formed at intervals of approximately 90 feet on centers, at all radii points at concrete entrances and curb returns, at locations no less than 3 feet and no more then 10 feet from drop inlets, at the end of days work, and or all cold joints.

## 3.2.2 FORMS – CURB & GUTTER

#### A. FIXED FORMS

Steel forms shall be used for the construction of curb and gutter. Fixed forms shall be straight, free from warp, and of such construction that there will be no

interference with the inspection of grade and alignment. Metal templates, not more than 3/16 inch in thickness and manufactured in accordance with the curb and gutter section, shall be set in the places provided in the forms not more than 10 feet apart. Templates shall be adjusted to prevent short sections (less than 5 feet). Forms shall extend the entire depth of the item and shall be braced and secured so that no deflection from alignment or grade will occur during concrete placement. Radial forms shall be sufficiently flexible or otherwise designed to provide a smooth, uniform, curved surface of the required radius. When sufficient concrete has been placed in the forms, it shall be well spaded along all areas in contact with the forms in order to eliminate all honeycombing. Face forms shall be removed as soon as concrete has attained sufficient set for the curb to stand without slumping. The exposed surface shall then be smoothed by the use of a suitable finishing tool.

#### B. SLIP FORMS

In some places the Contractor may desire to use the slip form method to pour curb and gutter. In such cases approval from the City Engineer will be required. The Contractor's proposed equipment must receive the approval of the City Engineer.

 Equipment: The slipform equipment shall be self-propelled and shall be equipped to consolidate, form, extrude, and finish the freshly placed concrete in such a manner that a minimum of hand finishing is required to produce a dense, consolidated, homogenous product. Slipform equipment shall be controlled to line and grade by automatic sensing, guidance, and control devices such that the machine automatically senses and follows taut guidelines or other stable reference, performing any necessary corrective action to ensure the correct grade and alignment is achieved.

The Contractor shall plan and stage the work to eliminate the need for the slipform machine to be stopped during placement operations.

- Attachments: The forms on the equipment must meet the precise dimensions shown on Standard Detail 402.01 for the different types of curb. A sufficient number of vibrators shall be provided on the machine and be in good working order.
- 3) Line and Grade Controls: It shall be the Contractor's responsibility to set the line and grade controls for his machine. These controls shall be checked by the City's Contractor before any "trimming" or pouring occurs. However, approval of these controls by the City's Contractor shall not relieve the Contractor of the responsibility of obtaining the planned grade or alignment according to the construction stakes.
- 4) Subgrade Trimming: It shall be the responsibility of the Contractor to ensure that the subgrade conforms to the Standard Details. No extra payment shall be made to the Contractor for "trimming" the subgrade if such "trimming" is less than the 6-inch limit allowed for unclassified excavation as defined in Section 02200, *Earthwork*. Before pouring operations begin, the subgrade shall be checked by the City's Contractor.

5) **Pouring Operations**: Before the machine starts a pour, the slump of the concrete will be checked in the presence of the City's Contractor. This slump must be between 0 and 2 inches. In the event that the slump exceeds 2 inches, the concrete will be rejected.

If it is determined by the City's Contractor that the poured curb or gutter does not meet the exact dimensions of the "standard drawings" or for some other reason it does not conform to these specifications, (alignment, grade, materials, etc.) then the Contractor, at his own expense, shall remove the faulty work before concrete obtains full set. No compensation shall be made for unsatisfactory work.

The Contractor shall make sure that sufficient vibration of the concrete occurs. If vibrators fail to function, all operations shall cease until they are satisfactorily repaired.

Where storm inlets are designated, the Contractor shall either leave a sufficient blank space to be hand formed later or work concrete to the exact dimensions for the standard inlet specified.

6) Defective Curb & Gutter: Honeycombed concrete shall be filled with a sand/cement paste and allowed to cure prior to backfilling curb. If in the opinion of the City Engineer the honeycombing, blemish or damage by construction equipment is extensive to the point of rendering a weak, cracked or otherwise questionable section of curb, in strength or appearance, the City Engineer will require the curb section to be replaced at the Contractor's expense.

# 3.3 STANDARD PORTLAND CEMENT CONCRETE SIDEWALK AND DRIVEWAY ENTRANCES

#### 3.3.1 GENERAL REQUIREMENTS

This work shall consist of the construction of Portland cement concrete sidewalk 4 inches thick and in accordance with these specifications and to the widths shown in the applicable Standard Details. Sidewalks crossing driveway entrances shall be constructed 6 inches thick. See **Standard Detail 404.03** for sidewalk.

All driveways shall have a 6 inch thick concrete apron from street to right-ofway. The width of residential driveways, measured at the right-of-way, shall be 12 feet minimum to 24 feet maximum. See **Standard Detail 404.01**. The width of commercial driveways shall be 20 feet minimum, measured face to face at the throat of the opening, up to a maximum width approved by the City of Wilson. See **Standard Detail 404.02**.

Unless otherwise shown on the plans and approved by the City Engineer, all sidewalks shall maintain a 1/4 inch per foot (2%) transverse slope.

Curb cuts for driveways and curb ramps shall be constructed as shown on the City's Standard Details for the type driveway or ramp specified on the plans or as directed by the City Engineer.

Curb ramps shall be constructed at all street intersection corners and at other major points of pedestrian crossing. The ramps shall be constructed as shown on the City's standard drawings for the type shown on the plans or as directed by the City Engineer to meet ADA/ABA requirements.

Wire mesh or reinforcing steel will be used if recommended by the City Engineer or shown on plans. For installation of mesh or steel, see Section 425, *Fabricating and Placing Reinforcement* of the NCDOT *Standard Specifications for Roads and Structures.* 

The foundation shall be thoroughly moistened immediately prior to concrete placement. Concrete shall be placed in forms by methods that will prevent segregation. Concrete shall be spread to the full depth and brought to grade by screeding and straightedging. Concrete shall be spaded adjacent to forms to prevent a honeycomb appearance, and the surface shall be floated with a wooden float to produce a surface free from irregularities. The final finish shall be obtained with an approved hand float that will produce a uniform surface texture. Light brooming may be used to hide trowel marks. Outside edges of the sidewalk slab and joints shall be edged with an edging tool having a radius of 1/4 inch.

When required as part of construction, reinforcing steel shall be properly spaced and thoroughly tied before concrete is placed.

All sidewalks (new or existing) fronting a new development shall be free of cracks, breaks, or other defects prior to receiving a Certificate of Occupancy.

See also paragraph 3.1.7, Protection of Concrete.

**Tolerances**: Horizontal alignment of sidewalks shall be to the lines and grades as shown on the plans and details. Vertical alignment shall not exceed +/- 3/8 inch in 10 feet from the plan grade.

## A. JOINTS FOR CONCRETE SIDEWALK AND DRIVEWAY ENTRANCES

Transverse expansion joints shall be constructed at intervals of approximately 32 feet. Slabs shall be separated by transverse preformed joint filler 1/2 inch in thickness that extends from the bottom of the slab to approximately 1/4 inch below the top surface.

The slab between expansion joints shall be divided into sections equal in width to the sidewalk by transverse score joints formed by a jointing tool, trowel, or other approved means. Transverse control joints shall also be provided when the time period between consecutive concrete placements is more than 45 minutes. Control joints shall extend into concrete for at least 1/4 of the depth (e.g 1 inch for 4-inch concrete sidewalk) and shall be approximately 1/8 inch in

width. Where slabs are more than 7 feet in width, the City Engineer may require that scored control joints shall be formed longitudinally to obtain secure uniform blocks that are approximately square. Transverse control joints shall also be installed where the corners of the drop inlets project into the sidewalk.

Expansion joints shall be formed around appurtenances extending into and through the sidewalk. An expansion joint shall be formed and filled with 1/2 inch preformed joint filler no less than 3 feet and no more than 10 feet from drop inlets. Preformed joint filler shall also be installed between concrete sidewalk and any adjacent fixed structure which is not tied to the sidewalk with steel dowels.

Place a joint sealant in cracks after removal of templates. Fill joints with joint sealer to the top surface of the sidewalk. See paragraph <u>2.1.11, Concrete Joint</u> <u>Sealer</u> for material spec.

#### B. PLACING CONCRETE

See paragraph 3.1.3, *Placing*, above.

C. FINISHING

See paragraph 3.1.5, *Finishing*, above.

D. CURING

See *paragraph 3.1.6 Curing* for requirements for curing concrete.

#### E. FORMS

- 1) Fixed forms: See paragraph 3.2.2 A Fixed Forms, above.
- Slip forms: Slip form pouring shall be allowed with approval of the City Engineer. All portions of paragraph <u>3.2.2 B</u>, <u>Slip Forms</u>, above, concerning pouring operations with slip forms shall apply.

## 3.4 PORTLAND CEMENT CONCRETE RETAINING WALLS, HEADWALLS, STEPS, PIERS FOR STREAM CROSSINGS, FLUMES AND DITCHES, MEDIAN BARRIERS, MEDIAN STRIPS, ISLANDS, ETC.

## 3.4.1 GENERAL REQUIREMENTS

This work shall consist of Portland cement concrete retaining walls, headwalls, steps, piers for stream crossings, flumes and ditches, median barriers, median strips, islands, etc. constructed in accordance with these specifications. These structures shall be constructed to the dimensions, cross-section, and located as shown on the plans, shown on the Standard Details, or as directed by the City Engineer.

#### A. REINFORCING STEEL

Reinforcement steel shall be placed in accordance with the drawings, the Concrete Reinforcing Steel Institute's *Placing Reinforcing Bars Recommended Practices,* the latest edition of ACI 318, *Building Code Requirements for* 

*Reinforced Concrete,* latest edition and Section 425, *Fabricating and Placing Reinforcement* of the NCDOT *Standard Specifications for Roads and structures.* See also <u>paragraph 2.1.8, *Reinforcing*</u> of this specification.

#### B. HANDRAILS

Handrails shall be placed in accordance with Section 1074, *Miscellaneous Metals and Hardware* of the NCDOT *Standard Specifications for Roads and Structures*, latest revision.

#### C. FLUMES AND DITCHES

Concrete flumes and ditches shall be constructed in accordance with Section 850, *Concrete Paved Ditch* of the NCDOT *Standard Specifications for Roads and Structures*, latest revision.

#### D. MEDIAN BARRIERS, MEDIAN STRIPS AND ISLANDS

Concrete median barriers, median strips, and islands shall be constructed in accordance with Section 852, *Traffic Islands and Medians* of the NCDOT *Standard Specifications for Roads and Structures*, latest revision.

# E. PIERS FOR STREAM CROSSINGS, STEPS, HEADWALLS AND RETAINING WALLS

Concrete retaining walls shall be constructed in accordance with Sections 420, *Concrete Structures* of the NCDOT *Standard Specifications for Roads and Structures*.

## 3.5 CONSTRUCTION METHODS FOR BRICK SIDEWALKS

See paragraph 2.6.4 of the <u>Street Design Section</u> for allowable locations for brick sidewalks. When permitted, the construction shall comply with the following.

- A. Subgrade Preparation: The subgrade for sidewalks shall be shaped to the proper cross-section and thoroughly compacted by rolling or tamping. Tree roots shall be removed to a depth of 12-inches below subgrade for the full width of the walk. All soft and spongy material shall be removed and replaced with suitable and approved borrow material (on-site or off-site). Borrow material shall be compacted in lifts not exceeding 8 inches in thickness.
- B. **Base:** Base to be 4-inch thick 3,000 psi concrete with a minimum of 1-inch thick stone screenings or sand. Concrete shall be 6-inches thick when crossing driveways.
- C. Sidewalk Width and Grade: Except when repairing a non-conforming brick sidewalk, the width shall be as specified by the city engineer and shall be laid to grade with a smooth uniform surface with a slope of ¼-inch per foot toward the street.
- D. **Material**: Brick shall conform to ASTM C902 Standard Specification for Pedestrian and Light Traffic Paving Brick.

- E. **Filling Voids**: The voids between the brick shall be filled with a mixture of sand and cement broomed into the voids. The sand-cement ratio shall be 1/3 cement and 2/3 sand well mixed before brooming into the voids. After the voids are well filled, the brick surface shall be cleaned of all excess sand and cement.
- F. See paragraph 3.6 below regarding maintenance of brick paved walks.

# 3.6 DECORATIVE (STAMPED OR TINTED) CONCRETE OR BRICK PAVED WALKS, DRIVES, AND PAVEMENTS

The City of Wilson does not maintain decorative concrete (stamped or tinted) or brick paved walks, drives, or roadway pavements other than to replace them with City standard hardscape elements. This includes maintenance or replacement due to damages arising from root heave or acts of God. Decorative concrete or brick walks and drives will be replaced with nonpigmented plain concrete with industry standard broomed or brushed finishes. In roadways, the hardscape will be replaced with asphalt.

If the abutting homeowner, developer or homeowner association desires to retain the decorative finish, the abutting homeowner, developer or homeowners association my opt to replace the hardscape at their expense provide the hardscape is replaced within 30 days of written notification from the City.

#### END OF SECTION 02400

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## 02630 – STORM DRAINAGE

(Last revised 4/23/12)

SELECTED LINKS TO SECTIONS WITHIN THIS SPECIFICATION

Part 1 – General Part 2 – Products Part 3 – Execution Abandoning Existing Storm Lines Construction of Manholes/DI's Corrugated Alum Alloy Pipe HDPE Pipe Inspection Installation of Boxes Laying Metal Pipe Laying Tolerance (pipe) Maintenance Masonry Structures Measurement & Payment MH Frame & Cover Spec Mortar Joints - Dewatering Mortar Joints in Conc Pipe Precast Concrete Structures Precast MH Spec Ram-Nek Reinf'd Concrete Pipe Spec

# PART 1 – GENERAL

#### 1.1 GENERAL

A. 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 stormwater utilities and appurtenances 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:

- 1) Storm sewer pipe Installation & appurtenances.
- Precast, cast-in-place, and masonry storm sewer structures & appurtenances.
- 3) Drainage ditches, channels, swales, BMP's and appurtenances.
- 4) Relocation of piping systems.

#### 1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this specification.
- B. Section 00825 Product Substitions
- C. Section 00950 Measurement and Payment
- D. Section 02275 Trenching, Backfilling, and Compaction of Utilities

- E. Section 02530 Sanitary Sewer
- F. Section 02920 Seeding, Sodding, and Groundcover
- G. City of Wilson List of Approved Manufacturers and Products
- H. NCDENR Division of Land Resources, Land Quality Section's "Erosion and Sedimentation Control Planning and Design Manual."

#### 1.3 SUMMARY

This section includes all equipment, labor, material, appurtenances, and services required for complete installation of storm drainage piping, ditches, structures, and specialties for municipal drainage systems.

#### 1.4 DEFINITIONS

A. General

For the purposes of this specification, the following definitions refer to storm water drainage systems and structures that come under the authority of the City of Wilson, North Carolina as specified within this section and other sections of this manual.

**Public Storm Drainage System**: Drainage systems and their appurtenances required for the conveyance of public storm water from and across publicly maintained streets, roads, highways, and other public property and located within public rights-of-way and/or easements.

See also paragraph 1.4, Definitions of section 02275, *Trenching, Backfilling and Compaction of Utilities.* 

- B. The following are industry abbreviations for various pipe materials.
  - 1) CAP: Corrugated Aluminum (Alloy) Pipe
  - 2) **RCP**: Reinforced Concrete Pipe
  - 3) **HDPE**: High Density Polyethylene (NCDOT Approved) double walled pipe.

#### 1.5 SUBMITTALS

- A. Submit shop drawings on all non-standard or alternate products/materials to the City Engineer in accordance with Section 00825 *Product Substitions*.
- B. Submit product data and shop drawings for the following.
  - 1) Drop/curb inlets
  - 2) Frame and covers
  - 3) Head/end walls
  - 4) Inlet grates

- 5) Concrete pipe and piping specialties
- 6) Precast concrete manhole castings
- 7) Corrugated Aluminum Pipe
- HDPE fittings

## 1.6 QUALITY ASSURANCE

- A. Materials and operations shall comply with the latest revision of all applicable Codes and Standards.
- B. Piping materials shall be marked clearly and legible on the outside of each section of pipe and pipe end.
  - 1) Reinforced Concrete Pipe shall be marked as follows:
    - a. Pipe Class and wall type,
    - b. Inside diameter of pipe product
    - c. Manufacturer name or trademark of manufacturer
    - d. Date of Manufacture
    - e. State assigned plant number
  - 2) Corrugated Aluminum Pipe shall show identification marks on pipe as follows:
    - a. Manufacturer's Name or Trade Mark,
    - b. Nominal thickness and type of aluminum
    - c. Specification Designation
    - d. Plant Designation Code
    - e. Date of Manufacture
  - Double walled corrugated HDPE pipe, end sections, tees, elbows and accessories shall be marked as follows:
    - a. AASHTO Designation
    - b. The date of manufacture
    - c. Name or trademark of the manufacturer

## 1.7 QUALITY STANDARDS

A. Materials and operations shall comply with the latest revision of the Codes and Standards listed below:

#### American Society for Testing and Materials

- ASTM C33 Concrete Aggregates
- ASTM C76 Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
- ASTM C478 Standard Specification for Precast Reinforced Concrete Manhole Sections

| ASTM C990  | Standard Specification for Joints for Concrete Pipe,<br>Manholes, and Precast Box Sections Using Preformed<br>Flexible Joint Sealants                                  |
|------------|--|
| ASTM D698  | Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft <sup>3</sup> ) (Standard Proctor).                               |
| ASTM D1556 | Standard Method of Test for Density of Soil in Place by the Sand-Cone Method   |
| ASTM D1557 | Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft <sup>3</sup> ) (Modified Proctor).                               |
| ASTM D2049 | Standard Method of Test for Relative Density of Cohesionless Soils   |
| ASTM D2167 | Standard Method of Test for Density of Soil in<br>Place by the Rubber-Balloon Method   |
| ASTM D2321 | Standard Practice for Underground Installation of<br>Thermoplastic Pipe for Sewers and Other Gravity-Flow<br>Applications  |
| ASTM D2487 | Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).  |
| ASTM D2922 | Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).   |
| ASTM D3212 | Standard Specification for Joints for Drain and Sewer<br>Plastic Pipes Using Flexible Elastomeric Seals  |
| ASTM D3350 | Standard Specification for Polyethylene Plastics Pipe and<br>Fittings Materials  |
| ASTM D3740 | Standard Practice for Minimum Requirements for<br>Agencies Engaged in the Testing and/or Inspection of Soil<br>and Rock as Used in Engineering Design and Construction |
| ASTM D4253 | Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.  |
| ASTM D4254 | Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.  |
| ASTM D4318 | Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.  |
| ASTM E329  | Standard Specification for Agencies Engaged in<br>Construction Inspection and/or Testing   |

|    | ASTM E548     | Standard Guide for General Criteria Used for Evaluating Laboratory Competence   |
|----|---------------|---|
|    | ASTM F477     | Standard Specification for Elastomeric Seals (Gaskets)<br>for Joining Plastic Pipe  |
|    | ASTM F2306    | Standard Specification for 12 to 60 in. [300 to 1500 mm]<br>Annular Corrugated Profile-Wall Polyethylene (PE) Pipe<br>and Fittings for Gravity-Flow Storm Sewer and Subsurface<br>Drainage Applications |
|    | American Ass  | ciation of State Highway & Transportation Officials   |
|    | AASHTO M86    | Concrete Sewer, Storm Drain, and Culvert Pipe   |
|    | AASHTO M17    | Reinforced Concrete Culvert, Storm Drain, and Sewer<br>Pipe   |
|    | AASHTO M19    | Joints for Circular Concrete Sewer and Culvert Pipe Using<br>Flexible Watertight Gaskets.   |
|    | AASHTO M19    | Precast Reinforced Concrete Manhole Sections  |
|    | AASHTO M20    | Reinforced Concrete Arch Culvert Storm Drain and Sewer<br>Pipe  |
|    | AASHTO M20    | Reinforced Concrete Elliptical Culvert, Storm Drain and Sewer Pipe  |
|    | AASHTO M24    | Reinforced Concrete D-Load Culvert, Storm Drain and Sewer pipe  |
|    | AASHTO M25    | Precast Reinforced Concrete Box Sections for Culverts,<br>Storm Drains, and Sewers  |
|    | AASHTO M27    | Precast Reinforced Concrete Box Sections for Culverts,<br>Storm Drains, and Sewers with Less than 2 feet of Cover<br>Subject to Highway Loadings  |
|    | AASHTO M29    | Corrugated Polyethylene Pipe, 12- to 24-inch Diameter for Type S.   |
| В. | Standard Abbr | viations:   |
|    | AASHTO        | merican Association of State Highway Transportation   |

- ACI American Concrete Institute
- ACPA American Concrete Pipe Association
- AISI American Iron and Steel Institute

| ANSI  | American National Standards Institute         |
|-------|---|
| AREA  | American Railway Engineers Association        |
| ASCE  | American Society of Civil Engineers           |
| ASTM  | American Society for Testing and Materials    |
| CRSI  | Concrete Reinforcing Steel Institute          |
| FS    | Federal Specifications                        |
| MSDS  | Material Safety Data Sheets                   |
| NCDOT | North Carolina Department of Transportation   |
| NCMA  | National Concrete Masonry Association         |
| NCSPA | National Corrugated Steel Pipe Association    |
| OSHA  | Occupational Safety and Health Administration |

## 1.8 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Pipe Condition/Pipe Examination:
  - New Pipe Inspection All pipe: Inspect materials thoroughly upon arrival. Examine materials for damage. 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.
    - a. **Concrete Pipe:** Check bells and spigots closely for smoothness, roundness, and honeycombing (concrete pipe), which may be a source of infiltration. Check for cracks, chips, etc. on both ends. Reject any pipe that will not provide soil-tight seal or is otherwise structurally deficient.
    - b. Corrugated Aluminum Pipe, Coupler Bands, Terminal Sloped End Section and other Special Fittings: All corrugated aluminum pipe, fittings and coupler bands shall be unloaded and handled with reasonable care. Pipe and fittings shall not be dragged over gravel or rock and shall be prevented from striking rock or other hard objects during placement on bedding. Pipe with protective coatings shall be handled with special care to avoid damage. Pipe on which such coatings have been damaged shall, unless repaired to the satisfaction of the City Engineer, be rejected at the site of the work regardless of previous approvals. Pipe having any localized bends in excess of 5 percent of the specified pipe diameter or any dent in excess of ½ inch shall be rejected. Rejected damaged pipe may be used if repaired to the satisfaction of the City Engineer. Repair may be made by jacking or by any other method meeting the approval of the City Engineer.

- Pre-Installation Inspection: Prior to being installed, each section of the pipe shall be carefully examined for damage and conformity with these specifications. All pipes damaged or deemed not to conform to these specifications shall be rejected and removed from site.
  - a. **Concrete Pipe**: All concrete pipes 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 of rigid pipe must be true.
  - b. Corrugated Aluminum Pipe: All aluminum pipes in which the pipe and bands cannot be made to fit properly shall be repaired as directed by the City Engineer, and if it cannot, it will be rejected. 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.
  - c. **Double Walled HDPE Pipe**: All double walled corrugated HDPE pipe in which the pipe and fittings cannot be made to fit properly shall be rejected. Protect pipe during handling using methods recommended by the manufacturer.
- B. Observe manufacturer's directions for delivery and storage of materials and accessories.
- C. Protect stored piping from entry of water or dirt into pipe. Protect bells and flanges of special fittings from entry of moisture and dirt.
- D. Handle precast concrete manholes and other structures according to manufacturer's written rigging instructions.

#### 1.9 PROJECT CONDITIONS

**Storm Drainage Manholes** – No water mains shall pass through or come in contact with any part of a storm drainage manhole. A minimum of 3 feet of horizontal separation shall be maintained between water mains and storm drainage manholes unless otherwise approved by the City Engineer or Stormwater Program Manager. Interference/conflict manholes will not be permitted unless otherwise approved by the City Engineer or Stormwater Program Manager.

See also paragraph 1.9 "Project Conditions" of section 02275, Trenching, Backfilling and Compaction of Utilities.

## 1.10 SERVICE INTERRUPTION

For service interruption, operation of valves, taps, fire hydrant operation, etc, contact the Water Resources Division at 296-3403. Provide a minimum of 48 hours notice or desired utility interruption or necessary operation of valves or hydrants.

#### 1.11 COORDINATION

A. Coordinate tie-in to municipal or NCDOT junction boxes or catch basins with the City Engineer or Stormwater Program Manager.

- B. Coordinate water service interruption with the City Engineer or Stormwater Program Manager. See paragraphs 1.11 and 1.12 of Section 02510 – *Water Distribution* for other requirements and procedures.
- C. At the direction of the City Engineer or Stormwater Program Manager and/or Water Resources Manager, temporary pumping/bypass of sewerage flow may be required to be provided. See <u>Section 02530</u> - Sanitary Sewer for by pass pumping requirements and procedures.
- D. When traffic signals, loops, or their appurtenances are likely to be damaged or interfere with construction, coordinate temporary operation with the applicable agency having jurisdiction of the signals. Provide a minimum of 1 weeks' notice prior to anticipated disturbance or interruption. At the discretion of the City Engineer or Stormwater Program Manager, the notice may be required to be published in the newspaper.
- E. **Repair of pavement markings**: When cuts are made through any paved surface and the cuts extend through the pavement markings, the replaced pavement shall be marked to match the existing.
- F. Benchmark/Monument Protection: Protect and maintain benchmarks, monuments or other established reference points and property corners. If disturbed or destroyed, they must be replaced at contractor's expense by a Licensed Professional Surveyor to full satisfaction of Owner/City of Wilson.
- G. Before Digging, contact "NC One Call" at 811 for location services.



#### 1.12 PUBLIC CONVENIENCE

The contractor shall at all times so conduct his 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 the City Engineer or Stormwater Program Manager.

#### 1.13 TRAFFIC CONTROL

- A. When working within any NCDOT System road or highway, 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.
- B. 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.
- C. A traffic control plan shall be submitted to the City Engineer or Stormwater Program Manager and NCDOT (if applicable) for approval.
- D. When traffic signals or their appurtenances are likely to be damaged or interfere with the construction, coordinate temporary operation with the NCDOT or the

City Engineer or Stormwater Program Manager. Provide 1 weeks' notice prior to anticipated disturbance or interruption.

- E. 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.
- F. Any work performed on a municipal public right-of-way or easement is required to obtain an encroachment permit from the City of Wilson. Refer to the *City of Wilson Right of Way Regulations and Procedures.* A copy of the approved permit is required to be on the project site at all times.

#### 1.14 EROSION AND SEDIMENTATION CONTROL AND NPDES MONITORING, CONTROLS, AND LIMITATIONS FOR PERMITTED DISCHARGES

See paragraph 1.14 of section 02275, Trenching, Backfilling and Compaction of Utilities.

# PART 2 – PRODUCTS

#### 2.1 PIPE & FITTINGS

#### 2.1.1 CORRUGATED ALUMINUM ALLOY PIPE

#### A. CORRUGATED ALUMINUM ALLOY PIPE

Corrugated aluminum alloy pipe must meet the requirements of AASHTO M196 except that Type IA pipe will not be permitted. The pipe sizes, gauges, and corrugations shall be as shown on the plans. Handling and assembly shall be in accordance with NCSPA's (National Corrugated Steel Pipe Association) recommendations.

#### B. JOINTS & FITTINGS IN CORRUGATED ALUMINUM ALLOY PIPE

Corrugated aluminum alloy pipe end sections and other fittings shall meet the requirements of AASHTO M196.

#### 2.1.2 CONCRETE PIPE

#### A. PLAIN CONCRETE PIPE (NOT PERMITTED)

#### B. REINFORCED CONCRETE PIPE

Reinforced concrete culvert pipe shall meet the requirements of AASHTO M170 for the class of pipe called for on the plans. The design wall thickness shall be the wall thickness shown in AASHTO M170 for the applicable class and wall. RCP shall be a minimum of Class III, Wall. Concrete pipe joints shall be tongue and groove type unless otherwise specified. RCP shall conform to the requirements of applicable sections of the latest revision of the NCDOT *Standard Specifications for Roads and Structures*.

RCP Class III or IV shall also meet ASTM C76, Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.

Gasketed joints in concrete pipe shall meet the requirements of paragraph <u>2.2.15, Preformed Plastic Gaskets</u>. Mortar joints shall meet the requirements of paragraph 3.1.1 G 1), *Mortar Joints*.

# 2.1.3 HDPE CORRUGATED POLYETHYLENE PIPE (ALLOWED OUTSIDE OF R/W ONLY)

Pipe shall be high-density polyethylene corrugated exterior/smooth interior pipe. 15-inch through 36-inch diameters shall meet all the requirements of AASHTO M294, Type S *Specification for Corrugated Polyethylene Pipe, 12- to 36-inch diameter.* 42-inch and 48-inch diameters shall have minimum pipe stiffness of 20 and 17 psi, respectively, at 5% deflection; and shall meet all other requirements of AASHTO M294.

Pipe coupling bands and end treatments shall conform to AASHTO M294.

## 2.1.4 CORRUGATED METAL PIPE (NOT PERMITTED)

#### 2.2 MISCELLANEOUS APPURTENANCES

#### 2.2.1 BEDDING

See Section 02275, Trenching, Backfilling, and Compaction of Utilities.

## 2.2.2 BRICK

Brick shall be hard clay, grade SM, ASTM C 32, *Standard Specification for Sewer and Manhole Brick (Made From Clay or Shale)* and AASHTO M91.

## 2.2.3 CATCH BASIN DROP INLETS & COMBINATION CURB OPENING INLETS

- A. Catch basin drop inlet or combination curb inlet boxes may be either precast reinforced concrete or concrete block. Precast inlet boxes shall conform to the requirements of <u>paragraph 2.2.14</u>, <u>Precast Underground Concrete Utility</u> <u>Structures</u>, as well as all applicable sections of the latest revision of the NCDOT Standard Specifications for Roads and Structures. Refer to Standard Details 633.02 633.03, 634.02, and 639.01.
- B. Inlet grates shall conform to the requirements of paragraph <u>2.2.8, Miscellaneous</u> <u>Gray Iron Castings</u>, and the applicable sections of the latest revision of the NCDOT Standard Specifications for Roads and Structures.
- C. Catch basin grates and curb opening inlet hoods are to be embossed with the words "Dump No Waste! Drains to Waterway." Castings shall also contain an embossed trout symbol. See Standard Detail 633.04.
- D. See the *City of Wilson List of Approved Manufacturers and Products* for a list of acceptable manufacturers and models.

## 2.2.4 CONCRETE BLOCK

Concrete block shall conform to the requirements of ASTM C139, *Standard Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes*.

## 2.2.5 CONCRETE FLARED END SECTIONS

Concrete flared end sections shall meet all applicable requirements of AASHTO M170 except those pertaining to design. All concrete flared end sections shall be reinforced. The concrete used in flared end sections shall be air entrained and shall attain strength of 3500 psi when tested in accordance with AASHTO T22. 3:1 slopes are required on flared ends.

#### 2.2.6 CONCRETE PIPE TEES AND ELBOWS (NOT PERMITTED)

## 2.2.6 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.

- A. Filter Fabric for Rip Rap: Filter Fabric for Rip Rap and Rip Rap Beddings shall conform to Section 1056 – Engineering Fabrics of the NCDOT Standard Specifications for Roadways and Structures, latest revision for Type 2 engineering fabric.
- B. Fabric for Subsurface Drains: Non-woven needle-punched fabric for subsurface drains shall conform to Section 1056 – Engineering Fabrics of the NCDOT Standard Specifications for Roadways and Structures, latest revision for Type 1 engineering fabric.

## 2.2.7 MANHOLE FRAMES AND COVERS

**Standard Frames and Covers:** Manhole frames and covers shall meet ASTM A48 *Standard Specification for Gray Iron Castings*, Class 35B, traffic frame and cover. See the *City of Wilson List of Approved Manufacturers and Products* for a list of acceptable manufacturers and models. Standard manhole frames and covers shall be manufactured to the dimensions and configurations shown on **Standard Detail C06.01** and shall have a minimum of four 1-inch diameter holes in the flange of the frame. Minimum inside diameter of the opening shall be 23 1/2 inches. Manholes castings may be either bituminous coated or plain. The bearing surface of the frame without rocking. Weights shall not vary more than 5%+/- of the weight shown on **Standard Detail C06.01**.

**Cast-in-Place Frames and Covers**: Manhole frames and covers shall meet ASTM A48 *Standard Specification for Gray Iron Castings*, Class 35B, traffic frame and cover. See the *City of Wilson List of Approved Manufacturers and Products* for a list of acceptable manufacturers and models. Cast-in-place manhole frames and covers shall have a minimum inside opening diameter of 24 inches. Frames shall be plain un-coated. Manholes covers may be either

bituminous coated or plain. 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 words "Storm Sewer" and "Dump No Waste! Drains to Waterway." See **Standard Detail 633.03**.

See the *City of Wilson List of Approved Manufacturers and Products* for a list of acceptable manufacturers and models.

## 2.2.8 MISCELLANEOUS GRAY IRON CASTINGS

**Catch basin frames and grates**: Supply gray iron castings meeting the requirements of ASTM A48 *Standard Specification for Gray Iron Castings*, Class 35B of AASHTO M306 as manufactured by Capitol Foundry, US foundry or East Jordan Iron Works. Boldly fillet castings at angles, and provide rises that are sharp and perfect. No sharp, un-filleted angles or corners are permitted. Provide castings that are true to pattern in form and dimension, free from pouring faults, sponginess, cracks, blowholes, and other defects affecting their strength and value for the service intended. Welding is not allowed for the purpose of making a casting structurally sound. Welding for cosmetic or other purposes is not allowed without approval of the City Engineer or Stormwater Program Manager. The iron material used in products provided shall have a minimum recycled material content of 75%. The recycled material shall consist of post-consumer material.

#### 2.2.9 MISCELLANEOUS CONCRETE

Concrete Classes (NCDOT) to Design Compressive Strength at 28 days (f'c):

| Class AA | General                       | 4,500-psi |
|----------|-------------------------------|-----------|
| Class A  | General                       | 3,000-psi |
| Class B  | Massive or Lightly Reinforced | 2,500-psi |

Ready mixed concrete shall comply with ASTM C94, *Standard Specification for Ready-Mixed Concrete*. All exposed concrete shall be air entrained. Concrete strength shall be as specified on standard details and drawings. Unless otherwise specified, all concrete shall be Class B, minimum.

#### 2.2.10 MISCELLANEOUS STORMWATER APPURTENANCES

All miscellaneous stormwater appurtenances including but not limited to Endwalls, Headwalls, and Flared end sections shall conform to all applicable sections of the latest revision of the NCDOT *Standard Specifications for Roads and Structures*.

## 2.2.11 MORTAR FOR CONCRETE BLOCK & BRICK

Mortar shall be type M, ASTM C 270, *Standard Specification for Mortar for Unit Masonry* and ASTM C 144, *Standard Specification for Aggregate for Masonry Mortar*. Mortar shall be prepared from cement in perfect condition and shall be prepared in boxes for that purpose. No mortar that has stood beyond 45 minutes shall be used.

When specified by the City Engineer or Stormwater Program Manager, grout for cellular fill of block or voids shall be comprised of 3000-psi ready mix concrete with pea gravel aggregate. Do not provide air entrainment unless specified by the City Engineer or Stormwater Program Manager.

## 2.2.12 PORTLAND CEMENT

Type I, CSA normal, ASTM C150 Standard Specification for Portland Cement.

## 2.2.13 PRECAST REINFORCED CONCRETE MANHOLES

A. Precast reinforced concrete manholes shall be designed and manufactured in accordance with ASTM C478, Standard Specification for Precast Reinforced Concrete Manhole Sections, latest revision and AASHTO M199. Either an "O" ring joint conforming to the requirements of AASHTO M198 and ASTM C443 Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets or joints conforming to AASHTO M199 and ASTM C990 Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants may be used.

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 *Standard Specification for Concrete Aggregates* and ASTM C94 *Standard Specification for Ready-Mixed Concrete*. Manholes shall have monolithic base and eccentric cone flattop as applicable. Structures are to have steps. Manholes will have extended bases with appropriate reinforcing as directed by the City Engineer or Stormwater Program Manager. See the *City of Wilson List of Approved Manufacturers and Products* for a list of acceptable manufacturers and models.

## 2.2.14 PRECAST UNDERGROUND CONCRETE UTILITY STRUCTURES

- A. Structures of precast reinforced concrete shall be designed and manufactured in accordance with ASTM C913, Standard Specification for Precast Concrete Water and Wastewater Structures and ASTM C858, Standard Specification for Underground Precast Concrete Utility Structures, latest revision with preformed butyl rubber joint sealant meeting ASTM C990, Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed flexible Joint Sealants, 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 Standard Specification for Concrete Aggregates and ASTM C94 Standard Specification for Ready-Mixed Concrete. Unless shown otherwise on the drawings, structures are to have steps. Steel reinforcing shall conform to the requirements of ASTM C857, Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures, latest revision. Structures shall be designed for an H20-44 loading in traffic areas. See the City of Wilson List of Approved Manufacturers and Products for a list of acceptable manufacturers and models.
- B. Concrete to be minimum 4000 PSI. Provide all reinforcing steel which meets ASTM A615 for grade 60 and welded wire fabric conforming to ASTM A185. Welded wire fabric may be substituted for rebar as long as the same area of steel is provided.

- C. Place lift holes or pins in accordance with OSHA standard 1926.704.
- D. Provide Precast structures over 4'-0" in depth with steps as directed by the City Engineer or Stormwater Program Manager.
- E. All junction boxes that are not grated are to be manufactured to receive manhole iron castings. No blind manholes are permitted.

## 2.2.15 PREFORMED PLASTIC GASKETS (JOINT SEALER)

Soil-Tight Gaskets: Preformed plastic gaskets shall meet federal specification SS-S-21A AASHTO M-198, Type B – Butyl Rubber. Sag or flow resistance and Chemical resistance shall meet ASTM C990. Preformed butyl gaskets shall be used with structures meeting ASTM C478, ASTM C990 and AASHTO M199.

#### 2.2.16 REINFORCING STEEL

Reinforcing steel shall conform to ASTM A615 Specification for Deformed Billet-Steel Bars for Concrete Reinforcement, Grade 60.

#### 2.2.17 RIP RAP AND RIP RAP BEDDING

Rip Rap and Rip Rap Bedding shall conform to Section 1042 – *Rip Rap Material* of the NCDOT *Standard Specifications for Roadways and Structures*, latest revision for Class A, B, 1 and 2 rip rap.

## 2.2.18 SUBSURFACE DRAINAGE

Subsurface drains shall conform to Section 1044 – *Subsurface Drainage Materials* of the NCDOT *Standard Specifications for Roadways and Structures*, latest revision.

## PART 3 – EXECUTION

#### 3.1 PIPE INSTALLATION - GENERAL

- 3.1.1 CONSTRUCTION ALL PIPE
  - A. **Trench Width**: Trench width shall be per **Standard Detail 511.02** unless approved otherwise by the City Engineer or Stormwater Program Manager.
  - B. Minimum Pipe Bedding Requirements: See paragraph
  - C. 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 or groove 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. Place non-woven Geotextile fabric around joints as specified in paragraph G3, Wrapping Joints.

- D. Directional changes in gravity lines: Use manholes for changes in direction of gravity lines. The City Engineer or Stormwater Program Manager may permit horizontal curves in pipe alignment for pipe greater than 48 inches in diameter where pipe has been manufactured with a beveled end.
- E. **Stringing out Pipe**: When pipe is strung out during unloading, 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.
- F. OSHA Trench Protection: Adhere to all OSHA requirements for trench slope protection, particularly Subpart P, *Excavations*, of 29 CFR 1926, latest revision. Trench walls may have vertical sides up to a maximum height of 5 feet above subgrade elevation. Beyond this depth, the entire sides must be laid back or a trench box, certified for the depths being used, must be used. Contractor is responsible for determining the proper and applicable slope based on type soil in order to meet Subpart P, *Excavations*, latest 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 the City of Wilson 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.
- G. Pipe Laying: Pipe shall be bedded per paragraph 3.2.7 Trench Preparation For Pipe, Section 02275, Trenching, Backfilling and Compaction of Utilities. 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 storm main may be field adjusted whenever, in the opinion of the City Engineer or Stormwater Program Manager, it is necessary, so long as the changes are consistent with the City of Wilson policy in affect at the time of the change. Changes in either grade or alignment may only occur at manholes. Where necessary, the invert grade shall be cambered by an amount sufficient to prevent the development of sag or back slope in the flow line. The developer's engineer will determine the amount of camber used. Where bell and spigot pipe is used, recesses shall be excavated to receive the pipe bells.

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. Jointing material 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 skillful manner as to obtain the degrees of water tightness required. Each joint shall be completely wrapped in geo-fabric overlapping itself and the joint at least 18". Lifting holes shall be plugged according to the manufacturer's recommendations. A sheet of geo-fabric shall be placed over the plugged lifting hole and pipe extending 18" from either side of the hole.

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 backfill 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.

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 at the Contractor's expense.

All joints shall be left exposed for inspection purposes during the working day and a suitable ladder affording easy and safe access for such inspection shall be furnished.

The Contractor at his own expense shall make any defects due to settlement good.

- 1) Mortar Joints: The mortar in the joints shall be composed of 1 part Portland cement and two parts clean sharp sand with 15% hydrated lime, by volume, added to the mixture. The pipe shall be clean and moist when mortar is applied. The lower portion of the bell or groove shall be filled with mortar sufficient to bring the inner surface flush and even when the next joint is fitted into place. The remainder of the joint shall then be filled with mortar and a bead or ring of mortar formed around the outside of the joint. The application of mortar to the inside of joints may be delayed until fill is completed where the pipe is in excess of 30 inches in diameter. The inside of all mortar joints shall be clean and smooth upon completion of the work. Competed mortar joints shall be cured and protected by permanently wrapping the exposed outside of the mortar joint with a layer of 30# roofing felt or a nonwoven Geotextile fabric.
- Soil-Tight Flexible Plastic Joint: Flexible joints meeting the requirements of paragraph <u>2.2.15</u>, <u>Preformed Plastic Gaskets</u> may be used in lieu of mortar joints. The outside of the pipe may be required to be wrapped in fabric. See paragraph 3 *Wrapping Joints*, below.
- 3) Wrapping Joints: In silts and sandy soils, wrap each storm drainage pipe joint with a non-woven Geotextile fabric. Fabric is to be placed a minimum of 18 inches on each side of the joint and shall lap itself a minimum of 18 inches.
- H. Use of Storm Drainage Pipe for Dewatering Subsurface of Streets (applies to pipe located inside public rights-of-way): For subgrade drainage purposes, the pipe shall be bedded in #57 stone (see Standard Detail 631.01) and the invert of the pipe joint, comprising the bottom 1/8<sup>th</sup> of the circumference of the pipe, is to be left open. Prior to placement of the pipe on the stone bedding place an 18-inch wide strip of non-woven Geotextile fabric along the perimeter of the open pipe joint to prevent migration of fine into the pipe. The fabric shall extend past the open portion of the joint at least 18 inches. Attach to pipe wall with tape or mastic to hold in place during backfill.
- Temporary Suspension of Work: When the trench is left for the night or if pipe laying is suspended, all exposed ends 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 ends of the pipeline at all times when laying is not in actual progress.

- J. **Cutting or Fitting Pipe**: Whenever a pipe requires cutting to bring a pipe to the required location, the work shall be done in a satisfactory manner with an approved cutting tool or tools that will leave a smooth end at right angles to the axis of the pipe and not otherwise damage the pipe. The method of cutting pipe shall be in accordance with manufacturer's recommendations. Such cuts shall be made by the Contractor without extra compensation.
- K. Joining Pipe of Different Size or Material: A drainage structure box is required at all pipe intersections (vertical and horizontal) and changes in pipe size or pipe material. Lateral taps and branches are not permitted without a junction box.

## 3.1.2 REINFORCED CONCRETE PIPE

- A. Pipe support for pipe shall provide uniform bearing for the pipe barrel along its entire length. The pipe shall be carefully laid on the prepared foundation/bedding, groove end upgrade with the tongue fully inserted and each joint checked for alignment and grade as the work proceeds.
- B. Pipe bedding: See Standard Detail 631.01 for minimum bedding requirements.
- C. Pipe with varying wall class must not be mixed between manholes or boxes.
- D. **Bury Limitations**: Table 2630.1 shall govern as the maximum allowable bury for reinforced concrete storm pipe. However, Design Engineer to verify and be responsible for maximum bury limitations based on jobsite conditions!

| States and the | Burne  | I footboat and the                  | 200                    |            |
|----------------|--|-------------------------------------|------------------------|------------|
| No Printer     | and a set of the set o | Limitations on I<br>hrough 60 inche |                        |            |
|                | Maximum Depth of Bury  |                                     |                        |            |
| Pipe           | Class III wall<br>(feet)   | Class IV wall<br>(feet)             | Class V wall<br>(feet) | Comments   |
| RCP            | 20   | 30                                  | 40                     | Notes a, b |
|                | Mini   | imum Depth of B                     | ury                    |            |
| RCP            | 2  | 1                                   | 1                      | _          |

<sup>a</sup>Fill height is measured from the top of the pipe to the bottom of the pavement structure. <sup>b</sup>Based on between a Type 1 and Type standard installation [as depicted in Standard Detail 631.01]) and on NCDOT Standard Detail 300.01, rigid pipe.

<sup>c</sup>Refer to AASHTO M170 and to ACPA Design Data 9, latest revision.

- E. Join concrete pipe using either mortar or bitumastic material to seal joint.
- F. Each joint shall be wrapped in a non-woven geo-fabric overlapping the joint and itself by at least 18". Geo-fabric shall also be placed over lifting pinholes after they have been properly plugged in accordance with the manufacturers' recommendations.

G. As each joint is laid, visually inspect to be certain that no jointing compound gasket, or trash is protruding from the joint or lying inside the pipe.

#### 3.1.3 DOUBLE WALLED CORRUGATED HDPE PIPE:

- A. Pipe support shall provide uniform bearing for the pipe barrel along its entire length. The pipe shall be carefully laid on the prepared foundation/bedding and each joint checked for alignment and grade as the work proceeds. Each joint shall be wrapped in a non-woven geo-fabric overlapping the joint and itself by at least 18".
- B. Installation of double walled corrugated exterior/smooth interior HDPE pipe shall be in accordance with ASTM D2321, *Standard Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe, latest revision* and as directed by the City Engineer or Stormwater Program Manager.
- C. Pipe Bedding and Backfill: Pipe embedment for HDPE pipe shall be minimum Type 5 Laying condition as shown on **Standard Detail 511.02**.
- D. Backfill and compaction shall conform to the applicable provisions of Section 02275, Trenching, Backfilling, and Compaction of Utilities. To prevent displacement of pipe, backfill shall be brought up evenly on both sides of the pipe. Backfill shall be suitable material such as free-draining sands and gravel conforming to ASTM D2321, Class I, II or III (see also Division 02275, Trenching, Backfilling, and Compaction of Utilities, paragraph 2.1.1.F for Satisfactory Soils). Lift thickness and compaction requirements for backfill shall conform to the requirement of Section 02275, Trenching, Backfilling, and Compaction of Utilities, managraph 2.1.1.F
- E. **Bury Limitations**: Minimum cover over pipe shall be 18 inches in a quality backfill envelope and where subject to light traffic loads. Non-traffic areas shall have a minimum of 12 inches of fill in a quality backfill envelope. Maximum cover over pipe shall be limited to 10 feet. At the discretion of the City Engineer or Stormwater Program Manager, deeper bury may be permitted provided calculations are submitted and sealed by a NC Professional Engineer for the proposed application.
- F. Leakage testing: Leakage rates of pipe shall not exceed 50 gallons/inch diameter/mile/day.

#### 3.1.4 FLEXIBLE ALUMINUM PIPE (ROUND AND ARCH)

A. Laying Flexible Aluminum Pipe: Installation shall be in accordance with AASHTO Standard Specifications for Highway Bridges, Section 26, Division II or ASTM A798, Standard Practice for Installing Factory-Made Corrugated Steel Pipe for Sewers and Other Applications and in conformance with the project plans and specifications. If there are any inconsistencies or conflicts, the Contractor must bring them to the attention of the City Engineer or Stormwater Program Manager. Flexible pipe shall be carefully placed on the foundation/bedding at the downstream end with the inside circumferential laps pointing downstream and with the longitudinal laps at the side or guarter points. Aluminum alloy pipe and paved invert pipe shall be handled with special care to avoid damage to pipe and/or coatings. When paved inverts are specified, paved invert pipe shall be installed with the paved invert centered on the bottom.

The pipe sections shall be joined with coupling bands, fully bolted. Coupling bands for annular and helical corrugated aluminum pipe shall provide circumferential and longitudinal strength sufficient to preserve the alignment, prevent separation of the sections, and prevent infiltration.

- B. Pipe bedding and installation for flexible metal pipe shall meet the requirements of NCDOT Standard Detail 300.01, sheets 1 & 3 as applicable..
- C. Backfill and compaction shall conform to the applicable provisions of Section 02275, Trenching, Backfilling, and Compaction of Utilities. Backfill shall be brought up evenly on both sides of the pipe. Backfill shall be suitable material such as free-draining sands and gravel conforming to ASTM D2321, Class I, II or III (see also Division 02275, Trenching, Backfilling, and Compaction of Utilities, paragraph 2.1.1.F for Satisfactory Soils). Lift thickness and compaction requirements for backfill shall conform to the requirement of Section 02275, Trenching, Backfilling, and Compaction of Utilities, Backfilling, and Compaction of Utilities, Tables 2275.3 and 2275.4.
- D. Bury Limitations: Unless otherwise approved by the City Engineer or Stormwater Program Manager, the minimum cover over pipe shall be 24 inches in a quality backfill envelope. Maximum cover over pipe shall be limited to 6 feet. At the discretion of the City Engineer or Stormwater Program Manager, deeper bury may be permitted provided calculations are submitted and sealed by a NC Professional Engineer for the proposed application or, with the approval of the City Engineer or Stormwater Program Manager, the installation guidelines in NCDOT Standard Detail 300.01 are followed.

#### 3.2 MANHOLE CONSTRUCTION FOR PRECAST STANDARD MANHOLES AND DROP INLET BASES

- A. Standard Manholes and Drop Inlet Bases: Manholes shall be constructed in accordance with the NCDOT Standard Detail 840.52 and the City of Wilson Standard Detail 732.03 with the following exceptions:
  - 1) Flexible boots and precast concrete inverts will not be required.
  - 2) Joints will be as specified in the product section of this specification.
  - 3) The pipe opening in precast units shall be at least 4 inches but not more than 8 inches larger than the outside diameter of the pipe. Pipe openings shall be formed, drilled, or neatly cut as approved by the Engineer.
  - 4) The Contractor may use brick and masonry block or concrete pipe cutoffs in conjunction with mortar to fill the void between pipe culverts and precast structures. Such materials shall be thoroughly wetted and bonded with mortar. The remaining exterior and interior void shall be filled and sealed/slicked with mortar to the contour of the precast structure.
  - 5) The standard joint shall be sealed on the interior of the structure, after installation, with a non-shrink hydraulic cement mortar.

- 6) Do not plug weep holes. Place a non-woven Geotextile fabric over weep holes.
- 7) Pour concrete inverts in all structures. Concrete shall be in compliance with products section for miscellaneous concrete of these specifications. Shape manhole channel with a smooth semicircular bottom matching inside diameter of the connecting pipe/pipes. Change directions of flow with a smooth curve of as large a radius as the manhole size will permit. Change size and grade of channels gradually and evenly. Shape the shelf to provide a slope between 1 and 2 inches per foot towards the invert.
- 8) Manholes shall be installed plumb.
- 9) Manholes shall be no less than 4 feet in diameter. Larger diameter manholes needed to accommodate larger pipe shall be sized based on an angle of entry sufficient to accommodate adjacent pipe, with sufficient annular clearance to permit pipe entry into manhole, while also providing a vertical undisturbed column of reinforced concrete between adjacent pipes of at least 8 inches in thickness for manholes up to 12 feet in depth.
- 10) Place #57 stone around pipe penetrations into manhole base. All penetrations in manhole bases shall be inspected prior to backfilling structure with stone around pipe. See **Standard Detail 639.01** for detail of treatment around pipe.
- 11) NCDOT Standard Detail 840.53 may only be used if approved by the City Engineer or Stormwater Program Manager prior to its proposed use.
- 12) Manholes shall be fabricated in such a way as to minimize the potential of the pipe landing in a riser joint.
- B. Adjustments: The Contractor shall exercise care in the ordering of structures so that the use of brick for leveling and adjustments can be minimized. Where adjustment of a manhole is required, grade rings shall not be used unless otherwise approved by the City Engineer or Stormwater Program Manager. Where adjustment of the inlet is required, the use of bricks is approved, provided that the entire void between the flat-top and inlet is also filled with brick and mortar to uniformly distribute loading of the inlet. The depth of bricks shall not exceed 12 inches before removal of the cone or flat-top is necessary for adjustment (see Standard Detail C06.03).

On all storm manholes, a mastic joint material shall be placed between the frame and cover and the cone or grade ring.

When applicable, during the installation of manholes, if frame and cover is near or within wheel path in roadway, turn cone to place the frame out of wheel path.

## C. Replacement/Rehabilitation of Existing Manholes:

When a new manhole is necessary, the old manhole must be completely removed and a new precast manhole set in its place. Where the old manhole is of satisfactory quality, the Contractor will make connection thereto as directed by the City Engineer or Stormwater Program Manager at no additional cost even if it is necessary to modify the bottom of the manhole to meet the new grade. Such extras are considered incidental to the manhole connection cost.

# 3.3 PRECAST REINFORCED CONCRETE STORM DRAINAGE BOX STRUCTURES (Flush Wall, Waffle and Knockout Panel Type):

- A. Design Requirements: <u>See paragraph 2.2.14</u>, <u>Precast Underground Concrete</u> <u>Utility Structures</u>
  - Formed Inverts: All boxes shall have formed inverts. Invert forming is to be performed after the pipe penetrations have been made, the annular space around the pipe grouted and the pipe sawn flush with the interior face of the structure.
  - 2) Seal joints with a flexible butyl rubber.
- B. **Box Size**: The outside pipe diameter plus 2" or the opening required for frame and grate is the minimum structure size whichever is greater.
- C. **Maximum Depth** (manhole junction boxes and catch basins): Limit maximum depth to top of bottom slab for waffle wall structure to 10'-0"; limit solid wall structure to 15'-0" unless approved otherwise by the City Engineer or Stormwater Program Manager.
- D. Grade Adjustment: Precast storm drainage boxes with knockout panels shall be set to the prescribed grade designated on the construction drawings. Boxes shall be placed on a stone bed of a minimum of 6 inches of #57 stone. Boxes shall be adjusted to final grade by the addition of either precast reinforced concrete grade rings or solid clay brick or concrete masonry with type M mortar. Boxes may not be saw cut to lower the grade unless first approved by the City Engineer or Stormwater Program Manager and then by no more than 2 inches. Due to the potential for grade variation in setting the structures, and to avoid cutting the boxes, it is recommended that boxes be ordered slightly short of the depth required to permit final grade adjustment by adding risers. However, the total depth of riser ring or masonry adjustment shall not exceed 8 inches.

# E. Pipe Penetration(s) Into Boxes:

- 1) Cut or form openings for pipe to provide required size and location. Remove knockout panels by saw cutting. Cut to pipe OD plus 2 inches.
- 2) Orient waffle wall structures so that pipes enter through the knockout/waffle panels only.
- 3) Preformed pipe penetrations may enter through the corners of solid wall precast boxes if a minimum of 6" of wall is provided above the hole.
- 4) Patching: The pipe shall be placed in the hole and the annular opening grouted the full 360 degrees of the pipe diameter with concrete. The grouted pipe penetration shall be inspected prior to backfilling. Once the concrete collar has set (4 days minimum), pipe(s) protruding into the box shall be cut flush with the inside face of the box and the annular edge grouted to form a smooth entrance.
- F. **Manhole Junction Boxes**: Every junction box shall have manhole access. No blind manholes are permitted.
- G. Frame and grate height may be adjusted with concrete or brick in accordance with City of Wilson specifications. Use manhole frame and cover as indicated on

the plans. Reinforce manhole opening in top as shown on standard details or as designed by NC Professional Engineer for required loading condition.

H. Precast boxes may be used for City of Wilson Standard Details 633.02, 633.06, and 634.01. See also <u>Table 2630.2</u> for a list of approved NCDOT Standards with precast boxes.

#### 3.4 MASONRY STRUCTURES:

#### A. Design Requirements:

- Invert Forming: All boxes shall have formed inverts. Invert forming is to be performed after the pipe penetrations have been made, the annular space around the pipe grouted and the pipe sawn flush with the interior face of the structure.
- B. Masonry construction shall conform to Section 834, Block Masonry Construction – General and Section 840, Minor Drainage Structures of the NCDOT Standard Specifications For Roads and Structures, latest edition. Clay brick structures are not permitted.
- C. Masonry boxes may be used with the City of Wilson Standard Details 633.02 and 634.01. See also <u>Table 2630.2</u> for a list of approved NCDOT Standards with brick boxes.
- D. Maximum Depth/Wall Thickness: See Standard Detail 634.02, Drainage Structure Notes.

Top and bottom slabs to be designed by NC Professional Engineers and approved by City Engineer or Stormwater Program Manager for H20 loading condition.

- E. **Maximum Wall Span**: The maximum horizontal span of an 8-inch thick wall shall not exceed 8 feet for boxes 8 feet or less in depth and 10 feet for boxes 12 feet or less in depth.
- F. Manhole Junction Boxes: Every junction box shall have manhole access. No blind manholes are permitted.
- G. Pipe Penetrations: Inside of boxes shall allow for 6 inches of clearance on both sides of pipe. The dimension shown on the structures in the standard details are minimum box dimensions. For boxes with greater dimensions add a reinforced concrete top slab or lengthen the box by adding additional grates and frames (see paragraph I, below regarding corbelling). Once pipe has been set and mortared in place, pipe projections shall be cut flush with interior face of the box.
- F. **Steps**: For structures over 4'-0" in depth, provide steps. Steps are to be located on a nonpipe wall. Steps to meet OSHA requirements.
- H. Grade Adjustment: Frame and grate height may be adjusted with concrete or brick. Use manhole frame and cover as indicated on the plans. Reinforce manhole opening in top as shown on standard details or as designed by NC Professional Engineer for required loading condition.

- I. Corbelling: Not permitted unless approved otherwise by the City Engineer or Stormwater Program Manager.
- J. Mortar in masonry structures is to be minimum type M.

# 3.5 NCDOT STANDARD DETAILS

The following NCDOT Standards are approved for use in the City of Wilson:

| Table 2630.2 |   |  |  |
|--------------|---|--|--|
| Detail       | Sheet Title   |  |  |
| 840.01       | Brick Catch Basin – 12" thru 54"  |  |  |
| 840.02       | Concrete Catch Basin – 12" thru 54"                                     |  |  |
| 840.04       | Concrete Catch Basin with Single and Multiple Pipes - 12" thru 48" Pipe |  |  |
| 840.05       | Brick Catch Basin with Single and Multiple Pipes – 12" thru 48" Pipe    |  |  |
| 840.14       | Concrete Drop Inlet – 12" thru 30" Pipe                                 |  |  |
| 840.15       | Brick Drop Inlet – 12" thru 30" Pipe                                    |  |  |
| 840.17       | Concrete Median Drop Inlet Type 'A' – 12" thru 72" Pipe                 |  |  |
| 840.18       | Concrete Median Drop Inlet Type 'B' – 12" thru 36" Pipe                 |  |  |
| 840.19       | Concrete Median Drop Inlet Type 'D' – 12" thru 36" Pipe                 |  |  |
| 840.26       | Brick Median Drop Inlet Type 'A' – 12" thru 72" Pipe                    |  |  |
| 840.27       | Brick Median Drop Inlet Type 'B' – 12" thru 36" Pipe                    |  |  |
| 840.28       | Brick Median Drop Inlet Type 'D' – 12" thru 36" Pipe                    |  |  |
| 840.31       | Concrete Junction Box – 12" thru 66" Pipe                               |  |  |
| 840.32       | Brick Junction Box – 12" thru 66" Pipe                                  |  |  |
| 840.41       | Spring Box – Concrete or Brick  |  |  |

# 3.6 CONSTRUCTION OF MISCELLANEOUS APPURTENANCES

End walls and other miscellaneous storm drainage items shall be constructed in accordance with the latest edition of the NCDOT *Standard Specifications For Roads and Structures* and the applicable NCDOT standard details.

# 3.7 ABANDONING STORM DRAINAGE LINES & MANHOLES

- A. **Storm Lines**: Unless directed otherwise by the City Engineer or Stormwater Program Manager, when an existing storm drainage line is designated to be abandoned in place, the low end of the line is to be plugged and lean concrete grout (flowable fill) pumped into the line until line is completely filled.
- B. **Manholes**: When an existing manhole, either partially or wholly, is designated to be abandoned and the storm lines, either entering or exiting the manhole, have been abandoned according to the preceding paragraph, the upper portion of the manhole shall be removed to a minimum of 18 inches below the proposed finished grade, or as determined by the City Engineer or Stormwater Program Manager, NCDOT #57 stone dumped into the manhole, and the stone vibrated to effect consolidation of the stone. The remainder of the fill between the top of the manhole and the finished subgrade is to be backfilled as follows. Where the manhole is located within a roadway right of way, backfill with NCDOT # 57 Stone and consolidate. Outside roadway right of ways, filter fabric shall be placed over the stone, suitable material of a compactable nature shall be placed over the top of the manhole, and the material tamped.

# 3.8 SLOPE ANCHORS

All lines on slopes equal to or greater than 20% slope shall have concrete anchors placed around the pipe directly below the bell end of the line. The anchors shall be spaced every other joint unless otherwise shown on the plans and constructed to the dimensions shown on the approved plans.

# 3.9 EXCAVATION OF DRAINAGE CHANNELS

- A. Open storm drainage channels and ditches shall be graded and shaped in accordance with the elevations, slopes, widths, and lengths indicated on the plans except that the side slopes shall be 3:1 or flatter. The outfall elevation of the new channels and ditches shall be graded to match the flow elevations of all existing or natural channels, unless indicated or specified otherwise.
- B. The drainage channels shaped with fill materials shall be compacted within the limits and in accordance with the related backfill work specified elsewhere.
- C. The drainage channels shall be prepared, seeded, and mulched in accordance with the related work specified elsewhere. Where indicated on the drawings, specified, or otherwise directed by the City Engineer or Stormwater Program Manager, erosions control measures, such as temporary liners, rip rap, concrete liners, etc., shall be provided.

# 3.10 PLACEMENT OF RIP RAP AND RIP RAP BEDDING

Placement of Rip Rap and fabric shall conform to Section 876 – *Rip Rap* of the NCDOT *Standard Specifications for Roadways and Structures*, latest revision.

# 3.11 SUBSURFACE DRAINAGE

Installation of subsurface drainage systems shall conform to the requirements of Section 815 – *Subsurface Drainage* of the NCDOT *Standard Specifications for Roadways and Structures*, latest revision using non-woven needle-punched fabric.

# 3.12 INSPECTION

At any time during construction up to and including completion of entire pipe installation, the City Engineer or Stormwater Program Manager may inspect the work in part or as a whole in order to satisfy himself/herself that every portion of the project has been faithfully carried out in accordance with the plans, specifications, and standard details, as applicable.

If, in the opinion of the City Engineer or Stormwater Program Manager, a defect exists in the pipeline or its appurtenances, in some place not accessible except by uncovering, the City Engineer or Stormwater Program Manager may order the line to be uncovered. If it is found that after the pipe has been uncovered at the order of the City Engineer or Stormwater Program Manager, no defect exists or that the defects were not the fault of the Contractor, then the expense so incurred by the Contractor shall be borne by the City.

Flush all sand, dirt, and debris from the lines prior to acceptance. Video taping of lines is to be performed in the presence of a City representative

Inspect the system for conformance with line and grades shown on the plans and provide record drawing measurements on record drawings.

**Visual Inspection**: All lines and manholes shall be visually inspected by the City of Wilson from every manhole by use of mirrors. At the direction of the City Engineer or Stormwater Program Manager, areas of questionable construction may be inspected by the City using television cameras (which are to be provided by developer and/or contractor). The lines shall exhibit a fully circular pattern when viewed from one manhole to the next. Lines, which do not exhibit a true and correct line and grade, have obstruction or structural defects, shall be corrected to meet these specifications and the barrel left clean for its entire length.

Laying Tolerance: Place pipe to the grades and alignment shown on the plans

**Horizontal Laying Tolerance**: 1:500 horizontal (straight runs), unless otherwise directed by the City Engineer or Stormwater Program Manager.

**Vertical Laying Tolerance**: Unless otherwise directed by the City Engineer or Stormwater Program Manager, the maximum permitted negative grade variation in post-construction pipe grade shall be -10% of the design grade. The computation of the post-construction pipe grade shall be based on a post-construction field survey. The grade shall be computed by taking the actual difference between the invert in and invert out of the pipe run divided by the actual pipe length. Pipe runs laid at less than the approved design grade must be removed and re-laid.

## Example:

Design Grade: 0.005 ft//ft or 0.5%

Field Check of Grade:

| Surveyed I<br>less Surveyed In<br>Dij |           | 96.50<br>96.04<br>0.46 | ft |                              |
|---------------------------------------|-----------|------------------------|----|------------------------------|
| Actual Pipe Run                       | Length =  | 100                    | ft | (not measured C-C of Boxes!) |
|                                       | Slope =   | 0.46<br>100            | =  | .0046 or 0.46%               |
| Variation Che                         | ck:       |                        |    |                              |
| Dest                                  | ign Grade | 0.50%                  |    |                              |
| Act                                   | ual Grade | 0.46%                  |    |                              |

Difference: 0.04%

Allowable deviation is 10% of Design Grade =  $0.10 \times 0.50\% = 0.05\%$ 

Allowable deviation of 0.05% > 0.04% allowable deviation ... VARIATION OK!

## 3.13 MAINTENANCE

The developer shall maintain all pipe installations in such a condition that they will function continuously from the time the pipe is installed until the development/project is accepted for maintenance by the City. Furthermore, soil erosion and sedimentation control measures shall be installed wherever necessary, including at curb inlets for example, and maintained for the duration of the development until the project is fully stabilized. Once permanent groundcover has been established, temporary erosion control measures shall be removed and the disturbed areas landscaped and seeded.

# 3.14 MEASUREMENT & PAYMENT

See Section 1.4 of 00950, Measurement and Payment.

## END OF SECTION 02630

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# 02740 – BASE COURSE AND PAVING

(Last revised 5/5/10)

SELECTED LINKS TO SECTIONS WITHIN THIS SPECIFICATION

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# PART 1 – GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this specification.
- B. Section 00825 Product Substitutions
- C. Section 00950 Measurement and Payment
- D. Section 02200 Earthwork
- E. Section 02275 Trenching, Backfilling, and Compaction of Utilities
- F. Section 02400 Curb & Gutter, Driveways and Sidewalks
- G. Section 02920 Seeding, Sodding, & Groundcover
- H. City of Wilson List of Approved Manufacturers and Products
- I. Bicycle lanes and paths shall be designed and constructed in accordance with the latest version of the NCDOT *NC Bicycle Facilities Planning and Design Guidelines*, latest revision, NCDOT Office of Bicycle and Pedestrian Transportation.

## 1.2 SUMMARY

This section includes all equipment, labor, material, and services required for complete installation of aggregate base courses and bituminous concrete pavement structures and specialties for municipal street and greenway systems.

## 1.3 DEFINITIONS

## A. General

For the purposes of this specification, the following definitions refer to roadway and street systems that come under the authority of the City of Wilson, North Carolina as specified within this section and other sections of this manual.

- Aggregate Base Course: A layer of graded aggregate materials (ABC unless otherwise specified by the City Engineer) of a specified thickness placed between the subgrade and the paving course.
- 2) **Base Course**: A layer of bituminous material of a specified thickness placed between the subgrade or aggregate base course and the intermediate or surface bituminous paving course.
- 3) **Cold Patch**: A layer of temporary asphaltic concrete mixture used for the repair and patching of small pavement areas in asphaltic concrete and Portland cement concrete in cool to cold weather applications.
- 4) Bikeway/Greenway: A facility, and its appurtenances, used for the public conveyance of pedestrians and/or bicyclists that is maintained by the City of Wilson, the North Carolina Department of Transportation, or other entity for the good of the public.
- 5) **Public Road System**: Roadway, streets, and their appurtenances required for the conveyance of the motoring public that are maintained by either the City of Wilson or the North Carolina Department of Transportation.
- 6) **Intermediate Course**: A layer of bituminous material of a specified thickness that is placed between the subgrade or base course and the surface bituminous paving course.
- Subgrade: The top surface of a roadbed shaped to conform to the typical section on which the pavement structure and shoulders are constructed.
- 8) **Subgrade Stabilization**: The modification of roadbed soils by admixing with stabilizing or chemical agents that will increase the load bearing capacity, firmness, and resistance to weathering or displacement.
- Suitable Subgrade: A subgrade that consists of a material type and density that is approved by the City Engineer for placement of a subsequent layer of material.
- 10) **Surface Course/Wearing Surface**: The top layer of a bituminous or concrete pavement structure which resists skidding, traffic abrasion, and the disintegrating effects of weather.

# 1.4 SUBMITTALS

A. Submit job-mix formula for each mixture to be supplied within 30 days after contract is awarded.

- B. Submit product data and shop drawings for manholes adjustment rings.
- C. MSDS sheet on cold patch.

# 1.5 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 and ASTM E548.
- B. Comply with all codes, laws, ordinances, and regulations of governmental authorities having jurisdiction over this part of the work.
- C. The Contractor shall comply with North Carolina Department of Environment and Natural Resources, "Erosion and Sedimentation Control Handbook," latest revision.
- D. Materials and operations shall comply with the latest revision of the Codes and Standards listed below:

# American Society for Testing and Materials

| ASTM C33   | Standard Specification for Concrete Aggregates  |  |  |
|------------|---|--|--|
| ASTM C136  | Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates   |  |  |
| ASTM D422  | Standard Test Method for Particle-Size Analysis of Soils (for classification purposes only)   |  |  |
| ASTM D698  | Test Method for Laboratory Compaction Characteristics of<br>Soil Using Standard Effort (12,400 ft-lbf/ft3) (Standard<br>Proctor)        |  |  |
| ASTM D1556 | Standard Method of Test for Density of Soil in Place by the Sand-Cone Method  |  |  |
| ASTM D1557 | Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft <sup>3</sup> ) (Modified Proctor) |  |  |
| ASTM D1883 | Standard Test Method for CBR (California Bearing Ratio) of Laboratory-Compacted Soils   |  |  |
| ASTM D2049 | Standard Method of Test for Relative Density of Cohesionless Soils  |  |  |
| ASTM D2167 | Standard Method of Test for Density of Soil in Place by the Rubber-Balloon Method   |  |  |
| ASTM D2487 | Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)  |  |  |

| ASTM D2922                | Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).   |
|---------------------------|--|
| ASTM D2937                | Standard Test Method for Density of Soil in Place by the Drive-Cylinder Method   |
| ASTM D3740                | Standard Practice for Minimum Requirements for<br>Agencies Engaged in the Testing and/or Inspection of Soil<br>and Rock as Used in Engineering Design and Construction |
| ASTM D4253                | Standard Test Methods for Maximum Index Density and<br>Unit Weight of Soils Using a Vibratory Table  |
| ASTM D4254                | Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density   |
| ASTM D4318                | Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils   |
| ASTM E329                 | Standard Specification for Agencies Engaged in<br>Construction Inspection and/or Testing   |
| ASTM E548                 | Standard Guide for General Criteria Used for Evaluating Laboratory Competence  |
| <u>American Associati</u> | on of State Highway & Transportation Officials   |
| AASHTO M145               | The Classification of Soils and Soil-Aggregate Mixtures for<br>Highway Construction Purposes   |
| AASHTO T99                | The Moisture-Density Relations of Soils using a 5.5-pound Rammer and a 12-inch drop  |
| AASHTO T180               | The Moisture Density Relations of Soils using a 10-pound Rammer and an 18-inch drop  |
| AASHTO T191               | Density of Soil In-Place by the Sand-Cone Method   |
| AASHTO T204               | Density of Soil In-Place by the Drive Cylinder Method  |
|                           |  |

## 1.6 STANDARD ABBREVIATIONS

AASHTO T205

- A. Materials and operations shall comply with the latest revision of the Codes and Standards listed below:
  - AASHTO American Association of State Highway Transportation Officials.

Density of Soil In-Place by the Rubber-Balloon Method

ANSI American National Standards Institute

| AREA  | American Railway Engineers Association        |  |
|-------|---|--|
| ASTM  | American Society for Testing and Materials    |  |
| FS    | Federal Specifications                        |  |
| HMA   | Hot Mix Asphalt                               |  |
| MSDS  | Material Safety Data Sheets                   |  |
| MUTCD | Manual on Uniform Traffic Control Devices     |  |
| NCDOT | North Carolina Department of Transportation   |  |
| OSHA  | Occupational Safety and Health Administration |  |
| RAP   | Recycled Asphalt Pavement                     |  |

# 1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Plant operations shall be in accordance with the applicable sections of Section 610, Asphalt Concrete Plant Mix Pavements of the NCDOT Standard Specifications for Roads and Structures, latest revision.
- B. Limitation for producing and placing ashpalt mixtures shall comply with Section 610-4, Weather, Temperature, and Seasonal Limitations For Producing and Placing Asphalt Mixutures, of the NCDOT Standard Specifications for Roads and Structures, latest revision.
- C. Storage shall be in accordance with Section 610-6, *Hot Mix Storage Systems* of the NCDOT *Standard Specifications for Roads and Structures*, latest revision.
- D. Hauling and Spreading shall be in accordance with Section 610-7, *Hauling of Asphalt Mixture* and Section 610-8, *Spreading and Finishing* of the NCDOT *Standard Specifications for Roads and Structures*, latest revision.
- E. Delivery:
  - 1) Hauling equipment shall be loaded in a manner to minimize segregation of the mix.
  - 2) Haul trucks must park in a designated area to minimize tracking of tack coats.
  - 3) Once loaded, haul trucks shall proceed immediately to the job site.

# 1.8 COORDINATION

- A. Coordinate manhole and valve box adjusting with the City Engineer or City Engineer's representative as it relates to resurfacing.
- B. Coordinate tie-in to municipal roadways with the City Engineer.

- C. All new paved areas shall have positive drainage to eliminate ponding. Where new paved areas join existing, measures shall be taken to incorporate positive drainage to eliminate ponding.
- D. Repair of pavement markings: When cuts are made through any paved surface and the cuts extend through the pavement markings, the replaced pavement shall be marked to match the existing.

# PART 2 – PRODUCTS

# 2.1 AGGREGATE BASE COURSE

Aggregate Base Course material shall be designated as ABC in accordance with Section 520, *Aggregate Base Course*, and Table 1005-1 *Aggregate Gradation, Coarse Aggregate* of the NCDOT *Standard Specifications for Roads and Structures,* latest revision.

#### 2.2 ASPHALT SURFACE TREATMENT

Asphalt Surface Treatment shall be in accordance with Section 660 Asphalt Surface Treatment of the NCDOT Standard Specifications for Roads and Structures, latest revision.

# 2.3 ASPHALT TACK COAT

Asphalt Tack Coat shall be in accordance with Section 605 Asphalt Tack Coat of the NCDOT Standard Specifications for Roads and Structures, latest revision.

#### 2.4 BITUMINOUS CONCRETE PAVEMENTS

Bituminous Concrete Pavements shall be in accordance with Section 610-3 Composition of Mixtures (Mix Design and Job Mix Formula) of the NCDOT Standard Specifications for Roads and Structures, latest revision.

#### 2.5 CEMENT TREATED BASE COURSE

Cement Treated Base Course shall be in accordance with Section 540, *Cement Treated Base Course* of the NCDOT *Standard Specifications for Roads and Structures*, latest revision or as specified by the City Engineer.

## 2.6 COLD PATCH

Cold Patch mixture shall have good workability and be capable of being placed at temperatures of 20° F to 140° F without the addition of heat. The mixture shall have good adhesion to wet surfaces and be resistant to damage by water, salt, and deicing products. It shall consist primarily of crushed stone, cut-back asphalt and additives. The mixture must be uniform and not require any mixing prior to use. It shall be capable of being removed from the container without significant adherence to the container. Application of the mixture must be able to be accomplished by hand labor. Traffic must be able to travel over the mix with little to no compaction immediately after installation without pick-up of the mix by vehicle tires. The mixture shall cure and harden with continued vehicle use. Provide MSDS sheets with product.

Approved products include the following:

| Product    | Manufacturer                         |  |  |
|------------|--------------------------------------|--|--|
| QPR        | Lafarage North America, Norcross, GA |  |  |
| E-Z Street | S. T. Wooten Corporation             |  |  |

#### 2.7 LIME-TREATED SOIL

Lime-Treated Soil shall be in accordance with Section 501 *Lime-Treated Soil* of the NCDOT *Standard Specifications for Roads and Structures,* latest revision or as specified by the City Engineer.

#### 2.8 PRIME COAT

Prime Coat shall be in accordance with Section 600 *Prime Coat* of the NCDOT *Standard Specifications for Roads and Structures,* latest revision or as specified by the City Engineer.

# PART 3 – EXECUTION

#### 3.1 GENERAL

Construction and testing shall conform to the applicable sections of Division 6 – Asphalt *Pavements* of the NCDOT *Standard Specifications for Roads and Structures*, latest revision. Other requirements for base course and pavement are also set out on the drawings and on the Standard Details shown in the City of Wilson standard street details.

#### 3.2 PAVEMENT, PATCHES, REPAIR AND REPLACEMENT

A. **General**: This work shall consist of replacing subbase stone, and bituminous material in the street in areas where it becomes necessary to remove the original pavement such as for sewer trenches, water main trenches, storm drainage pipe ditches, etc. Pavement repair shall be the type to match the existing street pavement as shown on **Standard Detail C01.03** or as determined by the City Engineer.

#### B. Cutting Pavement

Where a utility line is proposed to be placed 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 on each side (see **Standard Detail C01.02** for the width of the pavement). Perform cutting operations prior to installation of line to avoid excessive removal of pavement. Care shall also be taken during installation of pipe to avoid damage to adjoining paved surfaces. Additional cutting may be required to provide a straightedge.

#### C. Surface Tolerances

The bituminous patched surface will be tested using a 10-foot straightedge. The variation of the surface from the testing edge of the straightedge between any

two contacts with the surface shall not exceed ¼-inch allowing for the contours of the existing pavement. All humps or depressions exceeding the specified tolerance shall be corrected or the defective work removed and replaced with new material. Any deviation from this standard will be at the discretion of the City Engineer.

#### 3.2.1 PERMANENT PAVEMENT REPAIR

**Excavation**: Excavation of the existing pavement and subbase shall be made to the depth shown on the construction drawings or as directed by the City Engineer. Before the placement of any stone, concrete, or bituminous material, a representative of the City Engineer shall inspect the underlying subgrade. The Contractor shall be responsible for correcting any ruts or soft yielding places to the depth necessary to pass a proof roll of the subgrade before placing of the bituminous material.

#### A. Bituminous Pavement Repair

**Aggregate Base Stone**: The aggregate base shall be placed in accordance with **Standard Detail C01.03** and compacted to 95% of the Standard Proctor maximum dry density based on ASTM D698. A proof roll must be passed prior to the placement of any subsequent course. For subgrade compaction requirements, see *Table 2200.2A* of *Section 02200 Earthwork*.

**Bituminous Concrete Pavement**: Placing of the bituminous concrete pavement shall be placed in accordance with **Standard Detail C01.03**. Compact SF9.5A to 90% and all other mixes to 92% based on AASHTO T209.

- 1) **Bituminous Base Course**: Before placing any bituminous material, all sides of the existing pavement and subbase shall be thoroughly tacked at the rate of 0.3 Gal/SY.
- 2) **Bituminous Surface Course**: The finished surface shall abut the existing pavement with no overlap allowed. Care shall be taken to ensure a uniform grade between the existing pavement and the new surface.
- Rideability: Finished pavement surface shall be free of defects, irregularities, undulations, ridges, etc., whether transverse or longitudinal, that, in the opinion and discretion of the City Engineer, would negatively impact rideability.

#### B. Concrete Pavement Repair

**Aggregate Base Stone**: The aggregate base shall be placed to a depth as shown on the drawings or as directed by the City Engineer and compacted to 95% of the Standard Proctor maximum dry density based on ASTM D698. A proof roll must be passed prior to the placement of any subsequent course.

**Concrete Pavement**: Placing of the concrete pavement shall be performed in accordance with drawings or as directed by the City Engineer. Concrete shall meet Section 1000, *Portland Cement Concrete Production and Delivery* of the NCDOT *Standard Specifications for Roads and Structures*, latest revision except that the minimum compressive strength shall be 4000 psi air-entrained concrete.

The City Engineer reserves the right to require that the Contractor pull concrete test cylinders for verifying concrete strength.

## 3.2.2 TEMPORARY PAVEMENT REPAIR

#### A. Bituminous Pavement Repair

When shown on the plans, during winter months when bituminous concrete asphalt is unavailable or when directed by the City Engineer, temporary pavement patches shall be employed (see <u>paragraph 2.6, Cold Patch</u>). The Contractor shall maintain the temporary repair to the satisfaction of the City Engineer until the permanent pavement repair is made. Before placing any bituminous material, all sides of the existing pavement and subbase shall be thoroughly tacked at the rate of 0.3 gal/SY. The patch shall conform to the section shown on **Standard Detail C01.03**.

Density shall conform to the applicable sections referenced above under permanent pavement repair for each particular product (i.e. aggregate base course, bituminous concrete asphalt).

B. Once hot bituminous mix is available, all temporary patch material shall be replaced at the discretion of the City Engineer.

#### 3.3 AGGREGATE BASE COURSE (ABC)

## A. Weather Limitations

Stabilized aggregate base courses shall not be constructed unless the atmospheric temperature is at a minimum of 35°F and rising. Any areas of completed base course that are damaged by freezing shall be reconditioned, reshaped, and recompacted.

#### B. Subgrade Approval

The subgrade upon which the aggregate base course is to be placed shall be prepared in accordance with the requirements Section 02200, *Earthwork*. Prior to any spreading operations, the subgrade shall be checked and accepted by the City Engineer or his/her representative for adequate compaction and surface tolerances. The surface of the subgrade shall be dry and clean of all foreign substances. Any ruts or soft yielding places that may appear in the subgrade and any areas having inadequate compaction shall be corrected by loosening, removing and adding approved material, reshaping, recompacting the affected areas to line and grade, and pass a proof roll before the base course is applied. Proof-rolls shall only be conducted at the discretion of the City Engineer or his/her representative.

#### C. Installation of Aggregate Base Course

The aggregate base course shall be constructed in layers not less than 3 inches or more than 6 inches of compacted thickness. When vibrating with other approved types of special compacting equipment, the compacted depth of a single layer of the aggregate base course may be increased to 8 inches upon approval. The aggregate, as spread, shall be uniform in gradation with no segregation or pockets of fine or course material. Frequent template checks shall be made to ensure that a minimum amount of patching is necessary after complete compaction is secured.

#### D. Compaction Operations and Density Requirements

After mixing and spreading, the aggregate base course shall be well rolled and machined until thoroughly compacted at optimum moisture within +20% percent of optimum. Rolling shall progress gradually from the sides to the center and shall continue until the entire area of the course has been rolled by the rear wheels. Rolling shall continue until the full depth of the material has been compacted to not less than 95 percent density of the maximum dry density when tested in accordance with ASTM D1556, Standard Method of Test for Density of Soil in Place by the Sand-Cone Method, latest revisions.

A proof roll must be passed prior to the placement of any subsequent course.

Aggregate base course density shall also conform to the applicable requirements of NCDOT *Standard Specifications for Roads and Structures*, Section 1006, *Aggregate Quality Control/Quality Assurance*, latest revision.

## E. Grading Tolerances of Final Surface

After final rolling, the surface shall be inspected and any irregularities in excess of  $\frac{1}{2}$  inch shall be corrected. Aggregated base course shall conform to the lines, grades, and typical cross sections shown on the plans, details or as established by the City Engineer within a tolerance of  $\frac{1}{2}$  inch. Any irregularities in the surface shall be corrected by scarifying, remixing, reshaping, and recompacting until a smooth surface is obtained.

#### F. Maintenance

If directed by the City Engineer, either the aggregate base shall be opened to public traffic for at least 4 months before being surfaced or, prior to paving, the Contractor/Engineer shall provide to the City Engineer evidence that passing density tests meeting these specifications have been conducted on the subgrade, in trenches, and on the stone base. The minimum density requirements and frequency of tests shall meet the requirements of 02200 *Earthwork* and 02275 *Trenching, Backfilling and Compaction of Utilities*, as applicable. During the time the base is open to the public, the surface shall be protected against excessive base erosion, rutting, shoulder erosion, and washboarding; regrading as necessary to maintain rideability. However, traffic shall be kept off the base between preparatory final compaction and surfacing.

## G. Base Contamination

Should the base become contaminated, a sufficient depth of the base shall be removed, as determined by the City Engineer, replaced with ABC, and the base compacted to the minimum density specified in this specification.

# 3.4 CEMENT TREATED STABILIZATION

Cement Treated Stabilization shall be performed in accordance with NCDOT *Standard Specifications for Roads and Structures*, Section 540, latest revision or as specified by the City Engineer.

#### 3.5 LIME-TREATED SOIL

Lime-Treated Soil shall be performed in accordance with NCDOT *Standard Specifications for Roads and Structures*, Section 501, latest revision or as specified by the City Engineer.

#### 3.6 BITUMINOUS CONCRETE PAVEMENT

#### 3.6.1 CONDITIONING EXISTING SURFACES

#### A. Protection of Manholes and Valve boxes prior to final paving:

Where the rim and cover of a manhole or a valve box extends <u>more than 1 inch</u> above an unfinished road surface, a temporary layer of asphaltic concrete feathering shall be installed to provide a smooth transition from 1 inch below the edge of the rim and cover to the unfinished road surface. A 12:1 slope ratio shall be used. The exposed sides of the manhole and/or valve box shall be painted bright orange or as specified by the City Engineer. Prior to final paving, Contractor shall remove feathering completely and apply asphalt tack coat to binder to ensure proper asphalt adhesion. See **Standard Detail C05.01**.

1) Tacking: Contact surfaces of curbing, gutters, manholes, and other structures projecting into or abutting the pavement and cold joints of bituminous concrete asphalt shall be painted with a thick uniform coating of liquid asphalt prior to placement of bituminous concrete asphalt mixture. Application of tack at joints, adjacent to curbs, gutters, or other appurtenances shall be applied with a hand wand at the rate of 0.2 gallons per square yard. At joints, the hand wand applied tack shall be 2 feet in width with 4 to 6 inches protruding beyond the joint for the first pass. Tack for the adjacent pass shall completely cover the vertical face of the mat edge, so that slight puddling of asphalt occurs at the joint, and extends a minimum of 1 foot into the lane to be paved. Milled faces that are to remain in place shall be tacked as above for the adjacent pass. Use of tack at longitudinal joint vertical faces will not be required when 2 or more pavers are used such that one paver follows the front paver to the rear and side of the front (paving in echelon).

Tack shall be applied in such a manner as to offer the least inconvenience to traffic and to permit a minimum of one-way traffic without pickup or tracking. Care shall be taken to prevent spattering of adjacent pavement, structures, trees, and private property. Any spattering will be cleaned up by the Contractor at no cost to the City.

Payment for tack shall be included in bituminous concrete asphalt prices.

#### 2) Tack Coating Horizontal Surfaces: See paragraph 3.7, Tack Coat.

#### B. Removing Depressions/Irregularities

Where irregularities in the existing surface would result in a course more than 3 inches in thickness after compaction, the surface shall be brought to a uniform grade by snatching with a thin layer of bituminous concrete asphalt not exceeding the minimum thickness as recommended for that type of mix. Then

the material shall be thoroughly compacted until it conforms to the surrounding surface. The mixture used shall be the same as that specified for the surface mix to be placed.

## C. Bicycle/Greenway subgrade – Herbicide Treatment:

Herbicides shall conform to Section 1060-13, Herbicides of the NCDOT Specifications for Roads and Structures, latest revision shall be applied to the aggregate base course and/or subgrade no more than 15 minutes prior to paving. The rate of application shall be as recommended by the herbicide manufacturer. Herbicides shall not be used where they may contaminate water used for irrigation and drinking purposes.

# 3.6.2 PAVEMENT PROFILING - MILLING

The work included under this contract item shall consist of the removal of existing bituminous surfaces of in-place pavements on various streets within the City of Wilson, to produce the desired profile, cross-section, and surface conditions as specified by the City Engineer. All removed material shall become the property of the Contractor.

The Contractor shall plan and prosecute a schedule of operations so that milled roadways will be overlaid with bituminous concrete asphalt as soon as possible, and, in no instance, shall the time lapse exceed 4 days after the milling operations, unless otherwise specified. The milled areas of the roadway shall be kept free of irregularities and obstructions that may create a hazard or annoyance to traffic in accordance with the requirements of NCDOT *Standard Specifications for Roads and Structures*, Section 607, *Milling Asphalt Pavement*, latest revision.

The Contractor shall plan and prosecute the milling operation to avoid trapping of water on the roadway. At the discretion of the City Engineer, cutting drainage slots in roadway shoulders or inlets may be required, at no additional costs. The Contractor shall also restore the cut drainage slots and any damage due to weather or traffic afterwards at no additional cost to the City.

- A. The equipment and manpower furnished for this work shall be:
  - A cold milling machine capable of cutting at least 2 inches and 55 inches wide in flexible pavement while leaving a uniform cut and rideable surface capable of handling traffic prior to placement of a new bituminous overlay. The ground speed of the machine shall be independent of the cutting equipment. The machine shall maintain a sharp cutting edge at all times. The machine shall have a self-contained water system for control of dust and fine particles. The machine shall be capable of working in wet and dry conditions with temperatures down to 32°F.
  - The width of the machine shall be such to allow for one lane of traffic at all times. The machine shall be capable of cutting within 1 inch of manholes, valve box tops and facedown walks with a minimum radius of 5 feet.
  - 3) If the machine is not self-loading, then a capable loader shall be furnished for placing the material onto trucks.

- 4) A power broom or equivalent is to be used for cleaning the planed surfaces.
- 5) The Contractor shall furnish all hose and water.
- 6) Traffic control and flagman are to be provided by the Contractor.
- 7) All work associated with the milling operation shall be performed by the Contractor (such as asphalt removal at intersections and around utilities and clean up in yards).
- B. The construction methods shall be as follows:

Where bituminous pavement extends into the existing curb and gutter, the Contractor shall be required to plane at different slopes. The first cuts shall remove the material existing above the gutter line (whether by milling, motor grader, or hand shovel). These cuts will be made at the appropriate gutter slope (1/2":1') for both 24 and 30 inch curb and gutter. Any curb and gutter with a different slope will be planed at the existing curb and gutter slope.

The last cuts shall remove the material to a minimum depth of 1" below the gutter line, or to a depth as specified by the City Engineer, with a street cross-section slope of 1/4":1' or to slope of existing street.

Where curb and gutter exists but the pavement is at or below the existing gutter line, the pavement will be cut to a depth of the thickness of overlay below the gutter line while adjusting street cross-section to 1/4":1' toward the centerline of the street.

Where existing straight curbing has pavement built up to expose less than 6 inches of curbing, the pavement will be planed down on grade of 1/4":1' or whatever the existing grade of the street back to the street centerline until a desired height of curbing is exposed.

Where center of pavement has correct crown but, pavement has rutting or ripples (possibly caused by vehicular braking), the pavement will be planed to the depth necessary to remove all such defects.

If milling encroaches into base, the area shall be patched the same day.

C. Surface Casting Adjustments/Preparation: See paragraph <u>3.9B, Surface Casting</u> <u>Adjustments</u>.

#### 3.6.3 PAVING OPERATIONS

# A. Bituminous Concrete Pavement Equipment

Bituminous concrete pavement equipment shall be in accordance with Section 610 of the NCDOT *Standard Specifications for Roads and Structures*, latest revision.

#### **B.** Transportation of Bituminous Mixture

Transportation of bituminous mixture from the paving plant to the site shall be in trucks having tight, clean, and smooth beds. Each load shall be covered with canvas or other suitable material of ample size to protect it form the weather and to prevent the loss of heat. Prior to discharge from the hauling vehicle, the temperature of the mixture shall be within a tolerance of plus 15°F to minus 25°F of the specified job mix formula temperature. Any loads wet excessively by rain will be rejected. Hauling over freshly laid material will not be permitted.

#### C. Placing and Furnishing

Bituminous concrete asphalt shall only be placed when the weather conditions are suitable (see <u>paragraph I, *Placement Limitations*</u>, below).

Bituminous concrete asphalt shall not be placed until surface upon which it is to be placed has been approved by the City Engineer. Prior to delivery of surface course material, the base course shall be completed for receiving the surface course material and shall be kept from traffic, with the exception of the mixture vehicles and those other vehicles necessary for the placement of asphalt.

For strip paved streets, the edge of the pavement shall be marked by means of a continuous line placed and maintained a sufficient distance ahead of the paving operation to provide proper control of the pavement width and horizontal alignment.

Contact surfaces of curb and gutters, manholes, etc., shall be painted with a thin uniform coating of cut-back asphalt just before the surface mixture is placed against them. Immediately adjacent to headers, flush curbing, gutters, liners, and other structures, the surface course mixture shall be spread uniformly high so that after the final compaction it will be approximately 1/8 inch above the edge of the structure.

An approved asphalt paver shall be used to distribute the bituminous mix over the widest pavement width practicable. Wherever practicable and when the capacity of sustained production and delivery is such that more than one paver can be operated, pavers shall be used in echelon (i.e. when 2 or more pavers are used such that one paver follows the front paver to the rear and side of the front) to place the wearing course in adjacent lanes. Crossovers, as well as areas containing manholes or other obstacles that prohibit the practical use of mechanical spreading and finishing equipment, may be constructed using hand tools. However, care shall be taken to obtain the required thickness, jointing, compaction, and surface smoothness.

3) The longitudinal joint in one layer shall offset that in the layer immediately below by approximately 6 inches. However, the joint in the wearing surface shall be at the centerline of the pavement if the roadway comprises two traffic lanes or at lane lines if the roadway is more than two lanes in width. Offsetting layers will not be required when adjoining lanes are paved in echelon (when 2 or more pavers are used such that one paver follows the front paver to the rear and side of the front) and the rolling of both lanes occurs within 15 minutes after laydown.

The Contractor shall have a certified Asphalt Concrete Paving Technician present during paving operations. Immediately after placement and screeding, the surface and edges of each layer shall be inspected and straightedged by the

technician and necessary corrections performed prior to compaction. The finished pavement shall be uniform and smooth.

The placement of bituminous concrete shall be as continuous as possible and shall be scheduled such that the interruption occurring at the completion of each day's work will not detrimentally affect the partially completed work. Material that cannot be spread and finished in daylight shall not be dispatched from the plant unless the use of artificial lighting has been approved. When paving is performed at night, sufficient light shall be provided to properly perform and thoroughly inspect every phase of the operation. Such phases include cleaning planed surfaces, tack application, paving, compacting, and testing. Lighting shall be provided and positioned such as to not create a blinding hazard to the traveling public.

The Contractor shall distribute to each residence or business along a road to be paved, a flyer with notification of the work to be done and the dates it will be performed. Also to be included is a request that all vehicles be removed from the street during this time period. The flyers are to be delivered 2 to 4 days prior to the actual start date of the construction.

## D. Layer Thickness

**Minimum Layer Thickness**: Bituminous concrete SUPERPAVE pavement courses shall be placed in layers not exceeding 4.0 times the nominal maximum size aggregate in the bituminous mixture. The maximum thickness may be reduced if the mixture cannot be adequately placed in a single lift and compacted to required uniform density and smoothness. The minimum thickness for a pavement course shall be no less than 2.5 times the nominal maximum size aggregate in the bituminous mixture. These nominal maximum size aggregate in the bituminous mixture. These nominal maximum and minimum lift depths correlate as shown in the table below. If the proposed total depth for a prescribed mix type exceeds the maximum single layer depth shown in the table, the asphalt must be placed in **two lifts**; the first lift having a thickness of not less than the minimum single lift depth shown in the table. Asphalt cores must be taken to confirm thickness and compaction.

| Міх Туре             | Minimum Single<br>Lift Depth (inches) | Maximum Single<br>Lift<br>(inches) | Maximum Layer<br>Depth (inches) |
|----------------------|---------------------------------------|------------------------------------|---------------------------------|
| SF 9.5A              | 1 (resurfacing only)                  | 2                                  | 3                               |
| S 9.5X <sup>a</sup>  | 1.5                                   | 2                                  | 3                               |
| S 12.5X <sup>a</sup> | 2                                     | 2                                  | 4                               |
| I 19.0X <sup>a</sup> | 2.5                                   | 4                                  | 4                               |
| B 25.0X <sup>a</sup> | 3 <sup>b</sup>                        | 5.5                                | No Restrictions                 |
| B 37.5C <sup>a</sup> | 4.5                                   | 6                                  | No Restrictions                 |

<sup>a</sup> X=Level of Service

<sup>b</sup> For B 25.0X placed on stabilized subgrade, minimum lift thickness is 4.0 inches. Source: NCDOT 2006 HMA/QMS Manual.

## E. Joints

1) General: All joints shall present the same texture, density, and smoothness as other section of the course. The joints between old and new pavements

or between successive days' work shall be carefully made in such a manner as to ensure a continuous bond between old and new sections of the course. All contact surfaces of previously constructed pavements shall be painted with a thin, uniform coat of hot bituminous material just before the fresh mixture is placed.

Care shall be exercised when tying into curb and gutter and newly over-layed travel lanes to ensure a uniform grade and joint.

At tie-ins to existing pavement surfaces, the Contractor shall construct the final riding surface by cutting the existing asphalt for its full width to permit tying to the existing pavement; driveways and ramps included. Joint location to be determined and/or approved by the City Engineers. Suitable guide lines or devices shall be used to ensure cutting of the joint on a true line. The joint shall be thoroughly cleaned and dried prior to being sealed. This work shall be done at no additional cost to the City.

Method of temporary joints at the end of each workday shall be approved by the City Engineer.

In addition to the following, both transverse and longitudinal joints shall conform to Section 610-11, paragraphs (A) and (B), respectively of the *NCDOT Standard Specifications for Roads and Structures*, latest revision.

- 2) Transverse: The roller shall pass over the unprotected end of the freshly laid mixture only when the laying of the course is to be discontinued or when delivery of the mixture is interrupted to the extent that the unrolled material may become cold. Construct a sloped wedge ahead of the end of the full depth pavement to provide for compaction and the protection of the full depth pavement. Place a paper parting strip beneath this wedge to facilitate joint construction unless waved by the City Engineer. Before paving operations are resumed, remove the sloped wedge and cut back into the previously constructed pavement to the point of full pavement depth to expose an even vertical surface for the full thickness of the course as directed by the City Engineer.
- Longitudinal: In all cases, the edges of cold longitudinal joints shall be cut back to expose an even, vertical surface for the full thickness of the course prior to constructing the adjacent pavement.

#### F. Compaction

Immediately after the bituminous mixture is placed and struck off and surface irregularities are corrected, the mixture shall be thoroughly and uniformly compacted by rolling.

During compaction of bituminous concrete asphalt, the roller shall not pass over the end of freshly placed material except when a construction joint is to be formed. Edges shall be finished true and uniform.

The surface shall be rolled when the mixture is in the proper condition. Rolling shall not cause undue displacement, cracking, or shoving.

The number, weight, and type of rollers furnished shall be sufficient to obtain the required compaction while the mixture is in a workable condition. The sequence of rolling operations and the selection of roller types shall provide the specified pavement density. However, the minimum and maximum roller weight shall be 5 tons and 10 tons, respectively.

Immediately after the hot mixture is placed, it shall be sealed with rollers. Thereafter, rolling shall be a continuous process, insofar as practicable, and all parts of the pavement shall receive uniform compaction. In the event that the rolling operation is not able to properly keep up with the placement of the mixture, the finishing machine shall be stopped and no mixture shall be laid until the rolling has been caught up.

Rolling shall begin at the sides and proceed longitudinally parallel to the center of the pavement, each trip overlapping at least ½ the roller width, gradually progressing to the crown of the pavement. When abutting a previously placed lane, the longitudinal joint shall be rolled first, followed by the regular rolling procedure. On superelevated curves, rolling shall begin at the low side and progress to the high side by overlapping of longitudinal trips parallel to the centerline.

Displacements occurring as a result of reversing the direction of a roller, or from other causes, shall be corrected at once by the use of rakes or lutes and addition of fresh mixture when required. Care shall be taken in rolling not to displace the line and grade of the edges of the bituminous mixture. The motion of the roller shall be at all times slow enough to avoid displacement of the hot mixture. All roller marks must be eliminated.

To prevent adhesion of the mixture to the rollers, the wheels shall be kept properly moistened with water or water mixed with a very small quantity of detergent or other approved material. Excess liquid will not be permitted.

Along forms, curbs, headers, walls, and other places not accessible to rollers, the mixture shall be thoroughly compacted with hot hand tampers, smoothing irons, or mechanical tampers. On depressed areas, a trench roller may be used or cleated compression strips may be used under the roller to transmit compression to the depressed area.

Edges of bituminous pavement surfaces shall be true curves or tangents. Irregularities shall be corrected.

The surface of the compacted course shall be protected until the material has cooled sufficiently to support normal traffic without marring.

## G. Density

Superpave mix design criteria for mixes listed in Table 610-2 of the NCDOT *Standard Specifications for Roads and Structures* shall be minimum 90.0% (based on AASHTO T209) for SF 9.5A mix and 92% for all other mixes. Density shall also meet Table 610.4 of the NCDOT *Standard Specifications for Roads and Structures, latest revision*.

## H. Pavement Samples

Bituminous pavement coring sampling and density test reports shall be submitted at completion of project in accordance with the requirements of the NCDOT *Standard Specifications for Roads and Structures* Section 609, *Quality Management System For Ashphalt Pavements*, latest revision.

Provide reports on the results of the corings in accordance with Section 609-5, *Contractor's Quality Control System* of the NCDOT Standard Specifications for Roads and Structures, latest revision.

Suitability of the samples shall be based on the limits of precision specified in Section 609-6, *Quality Assurance* of the NCDOT Standard Specifications for Roads and Structures, latest revision.

# I. Placement Limitations

Asphalt mixtures that have temperatures of less than 225°F, when ready to dump into the mechanical spreader, will be rejected. All compaction rolling shall be completed prior to the mat cooling down to 175°F. Finish rolling may be performed at a lower mat temperature.

Do not place asphalt material when the air temperature, measured in the shade away from the artificial heat at the location of the paving operation and the road surface temperature in the shade is less than the temperatures shown in the following table:

| Asphalt Placement – Minimum Temperature Requirements <sup>1</sup> |                            |                                     |  |
|---|----------------------------|-------------------------------------|--|
| Asphalt Concrete Mix Type   | Minimum Air<br>Temperature | Minimum Road<br>Surface Temperature |  |
| Type SF 9.5A, S 9.5B  | 40°F                       | 50°F                                |  |
| S 9.5C, D, S 12.5C, D   | 50°F                       | 50°F                                |  |
| I 19.0B, C, D   | 35°F                       | 35°F                                |  |
| B 25.0B, C, B 37.5C   | 35°F                       | 35°F                                |  |

<sup>1</sup>Table 610-3 of NCDOT Standard Specifications for Roads and Structures

Other placement limitations, to include but not limited to, mixture temperatures, and cold weather paving shall be in accordance with Section 610, *Asphalt Concrete Plant Mix* of the NCDOT *Standard Specifications for Roads and Structures*, latest revision.

## J. Pavement Tolerance

The surface will be tested by using a 10-foot straightedge. The variation of the surface from the testing edge of the straightedge between any two contacts with the surface shall not be more than 1/4 inch. Humps and depressions exceeding the specified tolerance shall be corrected, or the defective work shall be removed and replaced with new material.

## K. Rideability:

Finished pavement surface shall be free of defects, irregularities, undulations, ridges, etc., whether transverse or longitudinal, that, in the opinion and discretion of the City Engineer, would negatively impact rideability.

## 3.7 TACK COAT

Procedures and equipment shall be in accordance with Section 605, *Tack Coat* of the NCDOT Standard Specifications for Roads and Structures, latest revision and <u>Section</u> <u>3.6 Bituminous Concrete Pavement</u> of these specifications.

All castings, the gutter edge, and other surfaces which pavement rests against shall be painted with asphalt tack coat material by way of a hand brush, or other approved means, prior to the placing of the surface course. All asphaltic cement or other materials which discolor the surface of concrete structures and items which are spilled or placed on such surfaces shall be removed at the Contractor's expense. His inability to remove such foreign and disfiguring stains shall result in the complete removal of the structures so stained or disfigured, and these removed structures or surfaces shall be replaced at his expense. Particular care shall be taken to prevent tack coat from getting into and on gutter areas.

When resurfacing existing pavements, the exiting pavement shall be tacked with RS-1H asphalt at the rate of 0.03 gallon per SY to 0.10 gallon per SY. Application of the tack coat shall be made by an approved asphalt distributor. The tack coat shall be allowed sufficient time to "break" prior to beginning the resurfacing operation.

## 3.8 ASPHALT SURFACE TREATMENT

Section 660, *Asphalt Surface Treatment* of the NCDOT Standard Specifications for Roads and Structures, latest revision.

## 3.9 PREPARATION OF PAVEMENT FOR RESURFACING

A. Preparation of Surface: Prior to beginning paving operations, the existing areas to be resurfaced shall be thoroughly cleaned by the Contractor to the satisfaction of the City Engineer. This cleaning shall include sweeping of the streets with a power operated broom, cutting excess debris with a grader, washing with a water truck, and hand cleaning any debris left over after this operation is complete. Cleaning operations shall commence just prior to the resurfacing of streets. In addition, the Contractor shall expose any existing paved areas, which have been covered by soil, grass, or debris. These areas shall be thoroughly cleaned, herbicide applied, and tacked before resurfacing. Any excess material left over after this operation shall be removed or spread out to the satisfaction of the City Engineer. No additional payment shall be made for this work.

When the surface of the existing pavement or base is irregular, it shall be brought to a uniform grade and cross per <u>paragraph 3.6.1B</u>; removing depressions and irregularities.

## B. Surface Casting Adjustments/Preparation

Any surface casting, such as water boxes, manholes, grates, cleanouts, etc., shall be set to grade prior to beginning of paving operation. All telephone manholes and gas boxes are to be adjusted by the utility companies or Contractor if approved by the City Engineer. All such castings shall be adjusted within a tolerance of 1/8 inch below or flush with the asphalt finished elevation. Where applicable, concrete riser rings or brick shall be placed under manholes

frames (see **Standard Detail C06.03**) to raise the rim to the proposed finished pavement grade. For metal adjusting rings, see **Standard Detail C06.04**. The Contractor shall be required to coat the top of any such casting with a suitable coating material to prevent adhesion of the bituminous material to the casting. A tack coat of bituminous material, conforming to the requirements of these specifications, will be applied prior to resurfacing operations.

If adjustment have to be made, make adjustments a minimum of 2 days and a maximum of 4 days prior to resurfacing. Installation of riser rings to be coordinated with inspector.

# 3.10 PROTECTION OF ASPHALTIC SURFACE COURSE

Sections of newly placed and compacted asphalt surface course shall be barricaded and protected from all defects for a period of at least 8 hours until they have become properly hardened by cooling. Protect asphalt from petroleum products during and following placement of surface course. When directed by the City Engineer, Certain resurfaced areas may require cooling of asphalt prior to opening to traffic.

If patching is required to make repairs, the base material in place shall be removed to a minimum depth of 4 inches, replaced with bituminous concrete base course (type B-25.0B) and surfaced with 2 inches of SF-9.5A bituminous asphalt concrete.

# 3.11 PAVEMENT MARKINGS

#### A. General

 Applicable Design Standards: Marking layout, dimensions, colors, etc. shall be subject to the requirements of the Manual on Uniform Traffic Control Devices (MUTCD) and the applicable details of the NCDOT Standard Roadway Drawings, latest revision. Unless otherwise noted below, pavement marking materials and preparation shall be of a thermoplastic material, and shall comply with Section 1087, Pavement Markings and Section 1205, Pavement Marking General Requirements of the NCDOT Standard Specifications for Roads and Structures, latest revision.

Prior to marking, all pavements are to be free of grease, oil, mud, dust, dirt, grass, loose gravel, and other deleterious material.

#### B. Thermoplastic Striping:

- 1) All thermoplastic striping shall be a NCDOT approved mix that minimizes the slipperiness of the marking surface.
- 2) Thermoplastic traffic line paint shall be a reflectorized thermoplastic pavement striping material applied to the road surface in a molten state by mechanical means. It shall have surface application of glass beads which, upon cooling to normal pavement temperature, will produce an adherent reflectorized stripe of the specified thickness and width.
- 3) The markings must be capable of conforming to pavement contours, breaks and faults through the action of traffic at normal pavement temperatures. The markings shall have resealing characteristics, such that it is capable of

fusing with itself and previously applied thermoplastic when heated with a torch.

- The markings must be able to be applied in temperatures down to 32°F, without any special storage, preheating, or treatment of the material before application.
- 5) Thermoplastic paint shall comply with NCDOT Standard Specifications for Roads and Structures, Section 1087-2C, Thermoplastic Composition, latest revision. The material shall contain at least 30 percent by weight of graded premixed glass beads. It must contain a minimum of 10% titanium dioxide pigment (ASTM D476 Type 2) to ensure a color similar to Federal Highway White, Color No. 17886, as per Federal Standard 595.
- 6) The surface must have a minimum skid resistance value of 55 BPN when tested according to ASTM E303, *Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester*, latest revision.
- 7) The material, when applied at a temperature range of 400°F to 440°F and shall set to bear traffic in not more than 2 minutes when the air temperature is 50°F. Minimum thickness shall be 90 mils for arrows, edge lines, diagonals, and gore lines; 120 mils for centerlines, skip lines, mini-skip lines, characters, and crosswalk lines.
- 8) The material must be resistant to deterioration due to exposure to sunlight, water, oil, gasoline, salt or adverse weather conditions.
- 9) When applied to Portland concrete surfaces, the application notes above still apply, except that a compatible surface primer/sealer shall be applied prior to the application of the Thermoplastic material to assure proper adhesion.
- 10) Do not apply thermoplastic pavement markings between December 15 and the following March 16.
- 11) Provide drainage openings at intervals of 250 feet in edge lines placed on the inside of curves and in edge lines on the low side of tangents. Provide openings that are a maximum of 12 inches and a minimum of 6 inches in length.

## C. Existing Pavement Markings:

- Prior to the installation of paint or thermoplastic pavement marking lines and symbols, the surface of existing pavement markings shall be cleaned by a method which does not materially damage the existing pavement surfaces.
- 2) Materials deposited on the pavement and adjacent surfaces as a result of the removal of pavement markings shall be removed as the work progresses.
- When a blast removal method is used, care must be taken to protect adjacent surfaces and structures from flying debris.

4) Painting over or black out painting of existing pavement markings with black paint or bituminous solutions shall not be allowed.

# END OF SECTION 02740

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# 02920 – SEEDING, SODDING AND GROUNDCOVER

(Last Revised 4/20/12)

SELECTED LINKS TO SECTIONS WITHIN THIS SPECIFICATION

| Part 1 | _ | General   |
|--------|---|-----------|
| Part 2 | - | Products  |
| Part 3 | _ | Execution |

Fertilizer, Product Spec Lime, Product Spec Maintenance Seeding Sodding Topsoil, Product Spec

# PART 1 – GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this specification.
- B. Section 00825 Product Substitutions
- C. Section 00950 Measurement and Payment
- D. Section 02200 Earthwork
- E. Section 02275 Trenching, Backfilling, & Compaction of Utilities
- F. Section 02510 Water Distribution
- G. Section 02530 Sanitary Sewer
- H. Section 02630 Storm Drainage
- I. City of Wilson List of Approved Manufacturers and Products
- J. NCDENR Division of Land Resources, Land Quality Section's *Erosion and Sedimentation Control Planning and Design Manual.*

#### 1.2 SUMMARY

- A. This section includes preparation of surfaces and application for seeding and sodding of areas proposed to be stabilized and landscaped in utility easements, on sites, along roadways and other applicable areas disturbed by construction.
- B. This specification covers seeding, sodding and groundcover but excludes trees, shrubs, plants, edgings, planters and irrigation.

# 1.3 DEFINITIONS

A. **GENERAL**: For the purposes of this specification, the following definitions refer to landscaping items that come under the authority of the City of Wilson as specified within this section and other sections of this manual.

- Finish Grade: In terms of landscaping, the surface that has been established, graded, raked, and prepared to receive groundcover, fertilizer, seed, and mulch; the finished surface of planting soil.
- 2) **Groundcover**: The material placed on a prepared surface and used to stabilize the soil from erosion.
- 3) **Sod**: An existing established matt of grass that has been removed from one area by a mechanical harvester and transferred to a prepared subgrade at another location; used to render a finished appearance and/or provide immediate resistance to erosion.
- 4) **Subgrade**: Surface or elevation remaining after completing the excavation before placement of topsoil.
- 5) **Topsoil**: A native, imported, or modified soil which is primarily organic in nature, free of rocks, clumps of clayey soils and otherwise friable in texture.

# 1.4 SUBMITTALS

- A. Submit product data and shop drawings for the following:
  - Seed certification: All seed shall be labeled to show it meets North Carolina Seed Law requirements. All seed must have been tested within 6 months of planting.
  - 2) A seed bag tag shall be submitted with final payment request from each type or mixture of seed used.
  - 3) Topsoil analysis, if requested by City Engineer. Soil testing shall state percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plantnutrient content of topsoil. Report is to state suitability of topsoil for lawn growth and recommend quantities of nitrogen, phosphorus, potash nutrients and soil amendments to be added to produce satisfactory topsoil.

## 1.5 QUALITY ASSURANCE

A. Materials and operations shall comply with the latest revision of all applicable Codes and Standards.

# 1.6 QUALITY STANDARDS

A. Materials and operations shall comply with the latest revision of the Codes and Standards listed below:

#### American National Standards Institute

ANSI Z60.1 American Standard for Nursery Stock

# American Society for Testing and Materials

ASTM C602 Specification for Agricultural Liming Materials

| ASTM D5268 Specification for Topsoil Used for Landscaping p |
|---|
|---|

# 1.7 STANDARD ABBREVIATIONS

- **AASHTO** American Association of State Highway Transportation Officials.
- ANLA American Nursery & Landscaping Association
- ANSI American National Standards Institute
- **ASTM** American Society for Testing and Materials
- FS Federal Specifications
- MSDS Material Safety Data Sheets
- NCDOT North Carolina Department of Transportation
- NCSPA North Carolina Sod Producers Association
- USDA United States Department of Agriculture

#### 1.8 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Handling/Storage:
  - 1) See Part 3 EXECUTION of these specifications for handling of sod materials during placement.
  - Observe Nursery's directions for delivery and storage of seed and sod materials.
  - 3) Store and protect fertilizer and lime until item is applied.

# 1.9 PROJECT CONDITIONS

- A. The Contractor is responsible for obtaining all applicable permits (encroachment, grading, etc.), making application, and paying permit fees.
- B. Seed mixture shall be chosen to ensure the development of plants during the season of planting, and to ensure future growth and permanence.
- C. Protect structures, utilities, sidewalks, pavements, and other facilities, along with lawns and existing exterior plants from damage caused by planting operations.
- D. Temporary Seeding: Denuded areas to be graded during the construction phases that are not to be brought to final grade shall receive temporary seeding and mulching. Temporary seeding shall also be used to stabilize finished grade areas if the time of year is outside the specified permanent seeding periods. All disturbed areas are to be stabilized with either temporary or permanent vegetation in accordance with <u>Table 2920.1</u>, <u>Stabilization Timeframes</u>, below.

- E. 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 not to disrupt drainage, alter, or destroy non-permitted wetlands unless a permit has been obtained. Restore areas noted on the project drawings, the contract documents, and/or in the permit. All encroachments shall be subject to US COE and NCDENR Division of Water Quality approval and permitting conditions.
- F. **Safety**: The Contractor shall keep the surface in a safe and satisfactory condition during the progress of the work.
- G. After seeding and mulching, care shall be taken to prevent future runoff destruction of seeded areas.

#### 1.10 SERVICE INTERRUPTION

Contact the City of Wilson 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 City Engineer, temporary service may be required to be provided. Provide a minimum of 72 hours notice of the proposed utility interruption or necessary operation of valves.

#### 1.11 LOCATING SERVICES

Contact "NC One Call" 811 before digging.



#### 1.12 COORDINATION

- A. Coordinate placement of groundcover with other Contractors and with the City Engineer.
- B. Proceed with planting only when existing and forecasted weather conditions permit.
- C. Protect undisturbed lawns, shrubs and trees and promptly repair damages caused by seeding, sodding, and groundcover operation.

## 1.13 WARRANTY

Warranty period for groundcover: 12 months from date of substantial completion if not designated as temporary cover.

# PART 2 – PRODUCTS

- 2.1 MISCELLANEOUS
  - 2.1.1 TOPSOIL
    - A. **Topsoil**: Comply with ASTM D 5268, *Standard Specification for Topsoil Used for Landscaping Purposes*, pH range of 5.5 to 7, a minimum of 4% organic

material content; free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth.

- On-site Topsoil Source: Reuse surface soil stockpiled on-site. Verify suitability of stockpiled surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth. Provide erosion control measures to prevent erosion, and off-site deposition of topsoil.
  - a. Contractor may supplement on-site source with imported or manufactured topsoil when quantities are insufficient. Obtain topsoil from naturally well-drained sites where topsoil occurs at least 4 inches in depth. Do not obtain from swamps or marshes.
- Off-site Topsoil Source: Obtain topsoil from naturally well-drained sites where topsoil occurs at least 4 inches in depth. Do not obtain from swamps or marshes.

# 2.1.2 FERTILIZER

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the composition as shown on Standard Detail 350.01.
- B. **Slow-Release Fertilizer**: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the composition as shown on **Standard Detail 350.01**.

# 2.1.3 LIME

A. Lime: ASTM C602, Standard Specification for Agricultural Liming Materials, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent, Class O, with a minimum 95 percent passing through No. 8 sieve and a minimum 55 percent passing through No. 60 sieve.

If ordered by the City Engineer, a pelted form of limestone with a water-soluble binder may be required to speed breakdown of limestone.

# PART 3 – EXECUTION

#### 3.1 CONSTRUCTION OF SUBGRADE

A. EXCAVATION, GRADING AND SUBGRADE PREPARATION FOR SEEDING/SODDING: Excavation, grading and subgrade preparation for seeding and/or sodding shall be in strict compliance with Division 02200, *Earthwork* and Division 02275, *Trenching, Backfilling, and Compaction of Utilities*, and this specification section, as applicable. The subgrade upon which this work is to be placed shall be smoothly shaped and compacted to a firm, even surface conforming to the elevation and cross-sections shown on the plans, the standard drawings, or as directed by the City Engineer. All soft, frozen, and unsuitable material shall be removed and replaced with approved material.

B. **FINE GRADING (Trimming)**: Fine grading shall be the responsibility of the Contractor to ensure that the finished grade conforms to the proposed finished grades as shown on the plans and the applicable standard details.

#### 3.2 SEEDING, SODDING, AND GROUNDCOVER

#### 3.2.1 GENERAL

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. 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 fertilized, limed, seeded, and mulched in accordance with Standard Detail 350.01.

If a utility line is installed through a landscaped lawn, the seeding shall be modified to restore ground cover comparable to the existing lawn.

B. 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.

- C. Seeding on rights of way of NCDOT maintained roads shall be in accordance with NCDOT specifications and the requirements of the approved encroachment permit.
- 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 the City and the NCDENR, Department of Water Quality, Land Quality Section. 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.

| Table 2920.1Stabilization Timeframes <sup>a</sup> |               |   |  |  |
|---|---------------|---|--|--|
| Site Area Description                             | Stabilization | Timeframe Exceptions  |  |  |
| Perimeter dikes, Swales,<br>Ditches, Slopes       | 7 days        | None  |  |  |
| High Quality Water (HQW)<br>Zones                 | 7 days        | None  |  |  |
| Slopes steeper than 3:1                           | 7 days        | If slopes are 10 feet or less in<br>length and are not steeper<br>than 2:1, 14 days are allowed |  |  |
| Slopes 3:1 or flatter                             | 14 days       | 7 days fo slopes greater than<br>50 feet in length  |  |  |
| All other areas with slopes<br>flatter than 4:1   | 14 days       | None, exepct for perimeters<br>and HQW zones  |  |  |

# E. Stabilization Timeframes:

<sup>a</sup>Effective August 3, 2011. Source: NCDENR/Division of Water Quality

# 3.2.2 SODDING/SEEDING

# A. GENERAL

The goal of sodding/seeding, where specified, is to return the disturbed area to its original vegetative condition, and to return the area to an aesthetically pleasing environment. Thus, all sodding/seeding shall meet the following requirements:

In most instances the areas requiring sod restoration versus seed restoration should be readily determinable by the Contractor based on preconstruction conditions. In general, where streets have roadside ditches, the area from the edge of pavement to the centerline of the ditch will be reseeded or sodded, depending on the existing condition of the grass. Installation in areas where there are no roadside ditches and traffic does not generally frequent, and has an existing good thick uniform stand of grass, shall be resodded.

Any questionable areas shall be restored in the manner (sodded or seeded) determined on site by the City Engineer.

<u>Vegetative restoration (sodding or seeding) shall be done as the work</u> <u>progresses.</u> Areas to be protected by a vegetative cover include, but are not limited to, any areas disturbed during construction that are not otherwise stabilized by gravel, concrete, or asphaltic paving, or other impervious built-upon surface.

Any area disturbed without owner authorization will be restored by the Contractor at his own expense. In all cases the Contractor will guarantee a stand of grass over the entire area.

The work to be done to acquire the necessary vegetative cover shall include but is not specifically restricted to appropriate tilling of the area, the application of fertilizer and lime for areas to be seeded, placement of sod, or sowing of seed and placing of a straw mulch to hold the seed and soil in place until germination and growth occur.

After bringing the area to be sodded or seeded to proper grade, the entire area shall be tilled to a minimum depth of 4 inches by discing, harrowing, or other approved means. Following tilling, all large debris and stones shall be removed to the satisfaction of the City Engineer and the surface leveled.

#### 3.2.3 MAINTENANCE OF SEEDED/SODDED AREAS:

Contractor shall provide a suitable backflow prevention devise for filling of water tank trucks or trailers (see **Standard Detail 519.01**). Contractor shall water sodded/seeded areas as necessary for providing for growth of sod/seed.

The Contractor shall provide general care for the restored areas as soon as the sod has been laid (or seeded and mulched), and such care shall continue until final inspection and acceptance of the work. All restored areas shall be protected against traffic or other use by warning signs or barricades approved by the City.

The Contractor shall mow the sodded and/or seeded areas with approved mowing equipment, depending upon climatic and growth conditions and the need for mowing specific areas. In the event that weeds or other undesirable vegetation are permitted to grow to such an extent that, either cut or uncut, they threaten to smother the species, they shall be mowed and the clippings raked and removed from the area. When the surface has been damaged during the period covered by this contract, the affected areas shall be repaired to reestablish the grade and the condition of the soil, as directed by the City Engineer, and shall then be sodded, or seeded, as specified.

#### 3.2.4 SODDING

All existing ornamental grass stands (commercial or private lawns) may be carefully taken up, protected and replaced to their original condition or the Contractor may elect to install new sod of the same grass type. Sod furnished by the Contractor shall have a good cover of living or growing grass. This shall be interpreted to include grass that is seasonally dormant during the cold or dry seasons and capable of renewing growth after the dormant period. All sod shall be obtained from areas where the soil is reasonably fertile and contains a high percentage of loamy topsoil. Sod shall be cut or stripped from living, thickly matted turf relatively free of weeds or other undesirable foreign plants, large stones, roots, or other materials, which might be detrimental to the development of the sod or to future maintenance. At least 70% of the plants in the cut sod shall be composed of the existing lawn species, and any vegetation more than 6 inches in height, shall be mowed to a height of 3 inches or less before sod is lifted. Sod, including the soil containing the roots and the plant growth showing above, shall be cut uniformly to a thickness not less than 2 inches.

After inspection and approval of the source of sod by the City Engineer, the sod shall be cut with approved sod cutters to such a thickness that after it has been

compacted, it shall have a uniform thickness of not less than 2 inches. Sod sections or strips shall be cut in uniform widths, not less than 10 inches, and in lengths of not less than 18 inches, but of such length as may be readily lifted without breaking, tearing, or loss of soil. Where strips are required, the sod must be rolled without damage with the grass folded inside. The Contractor may be required to mow high grass before cutting sod.

The sod shall be transplanted within 24 hours from the time it is stripped, unless circumstances beyond the Contractor's control make storing necessary. In such cases, sod shall be stored in an unrolled condition, irrigated, and protected from exposure to air drafts and sun and shall be kept from freezing. Sod shall be cut and moved only when the soil moisture conditions are such that favorable results can be expected. Where the soil is too dry, permission to cut sod may be granted only after it has been watered sufficiently to moisten the soil to the depth the sod is to be cut.

Sodding shall be performed only during the seasons when satisfactory results can be expected. Frozen sod shall not be used and sod shall not be placed upon frozen soil. Sod may be transplanted during periods of drought with the approval of the City Engineer, provided the sod bed is watered to moisten the soil to a depth of at least 4 inches immediately prior to laying the sod.

The sod shall be moist and shall be placed on a moist earth bed. Pitchforks shall not be used to handle sod, and dumping from vehicles shall not be permitted. The sod shall be carefully placed by hand, edge to edge and with staggered joints, in rows at right angles to the slopes, commencing at the base of the area to be sodded and working upward. The sod shall immediately be pressed firmly into contact with the sod bed by tamping or rolling with approved equipment to provide a true and even surface, and ensure knitting without displacement of the sod or deformation of the surfaces of sodded areas. Where the sod may be displaced during sodding operations, the workmen when replacing it shall work from ladders or treated planks to prevent further displacement. Screened soil of good quality shall be used to fill all cracks between sod sections. The quantity of the fill soil shall not cause smothering of the grass. Where the grades are such that the flow of water will be from paved surfaces across sodded areas, the surface of the soil in the sod after compaction shall be set approximately 1 inch below the pavement edge. Where the flow will be over the sodded areas and onto the paved surfaced around manholes and inlets, the surface of the soil in the sod after compaction shall be placed flush with pavement edges.

Adequate water and watering equipment must be on hand before sodding begins, and sod shall be kept moist until it has become established and its continued growth assured. Contractor shall water sodded areas a minimum of 1 inch of water, twice per week until re-established and once per week thereafter until work is accepted. In all cases, watering shall be done in a manner, which will avoid erosion from the application of excessive quantities and will avoid damage to the finished surface.

#### 3.2.5 SEEDING

Following surface preparation as described in paragraph <u>3.1A</u>, <u>Excavaton</u>, <u>Grading and Subgrade Preparation for Seeding/Sodding</u>, above, unless no soil test results are available, areas to be seeded shall be given an initial application of agricultural lime at a rate of at least 4,000 pounds per acre as well as fertilize and phosphate as shown on **Standard Detail 350.01**, all of which shall be thoroughly mixed with the soil. Dense or compacted soil areas and cut grade soil areas shall be ripped at greater than 6 inches of depth with a spring toothed ripper or similar equipment after finish grade but before tillage. Severely compacted surfaces shall be ripped to at least 12-inches of depth. No compaction soils shall be covered with soil fill until ripped. Finish grades on slopes shall be roughened parallel to contours to maximize surface storage and minimize runoff.

Upon completion of ground and soil preparation work, a grass seed mixture applied in accordance with **Standard Detail 350.01** shall be sown. When permitted to be placed, Bermuda grass seed shall be in an unhulled condition from September 1 to April 1 and be in a hulled condition at all other times. Centipede grass seed is permitted to be planted from April 1 through July 15. Target pH at 5.5 for centipede grass. Substitutions for "Rebel" fescue will be considered acceptable only if the substituted fescue variety has no ratings less than "5" as determined by the USDA 1983 Tall Fescue Trails or more recent USDA trail data. No rye grass or other ground cover species shall be included in the seeding mixture. This shall be followed by placing a suitable cover of clean straw or approved equivalent mulch at the rate specified in **Standard Detail 350.01**. If straw is used as a temporary cover only, these rates shall be doubled or tripled depending upon average slope conditions.

All straw shall be stabilized by the application of an asphalt emulsion or other approved binding materials. Alternative methods such as hydro-seeding or hydro-mulching may be considered on an individual basis.

A stand of grass shall be considered acceptable when area cover is at least 95%. The Contractor shall overseed, and otherwise maintain the grassed areas until the stand of grass has reached a uniform height of 3 to 4 inches and a state of uniform species maturity. The Contractor shall then top-dress the stand of grass with a minimum of 300 pounds per acre of 12-4-8 (4-1-2 or 3-1-2 ratio) fertilizer (or equivalent). Supply at least 1 lb. of nitrogen. Annual weed grasses and grain weeds shall not be considered part of the area cover, and seeding stands shall not be considered acceptable until the stand reaches a state of uniform post-seeding maturity for the specified species.

If straw mulching results in competing stands of grain, maintenance shall include mowing of the grain weed stand to a height of 4 inches prior to reaching a height of 10 inches. Grain weed stands shall not be considered part of the minimum 95% area cover. Unacceptable grass stands shall be overseeded, after aeration by spiker, at half the original rate, as many times as necessary to establish an acceptable stand.

#### 3.3 CLEANUP

A. Disposal. Remove surplus soil and waste material, unsuitable soil, trash, and debris and legally dispose of off-site.

### END OF DIVISION 02920

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# Gillette Athletic Complex Additions Geotechnical Engineering Report

January 17, 2023 | Terracon Project No. 70225204

### **Prepared for:**

Green Engineering, PLLC 303 Goldsboro St. E Wilson, North Carolina 27893



Nationwide Terracon.com

Facilities

Environmental
 Geotechnical

Materials



2401 Brentwood Road, Suite 107 Raleigh, NC 27604 P (919) 873-2211 North Carolina Registered Firm: F-0869 Terracon.com

January 17, 2023

Green Engineering, PLLC 303 Goldsboro St. E Wilson, North Carolina 27893

Attn: Leo E. Green, III P: 252-237-5365 E: elg3@greeneng.com

Re: Geotechnical Engineering Report Gillette Athletic Complex Additions 3238 Corbett Ave NE Wilson, North Carolina Terracon Project No. 70225204

Dear Mr. Green:

We have completed the scope of Geotechnical Engineering services for the above referenced project in general accordance with Terracon Proposal No. P70225204 dated September 16, 2022. This report presents the findings of the subsurface exploration and provides geotechnical recommendations for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.



Tom Schipporeit, P.E., D.GE Senior Geotechnical Engineer

ANDREW NASH

Andrew A. Nash, P.E. Geotechnical Department Manager

Gillette Athletic Complex Additions | Wilson, North Carolina January 17, 2023 | Terracon Project No. 70225204

# **Ferracon**

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# **Ferracon**

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GeoModel

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Exploration and Testing Procedures Photography Log Site Location and Exploration Plans Exploration and Laboratory Results Supporting Information

**Note:** This report was originally delivered in a web-based format. **Blue Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the **precon** logo will bring you back to this page. For more interactive features, please view your project online at **client.terracon.com**.

Refer to each individual Attachment for a listing of contents.

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# **Ferracon**

# **Report Summary**

| Topic <sup>1</sup>               | Overview Statement <sup>2</sup>   |  |  |
|----------------------------------|---|--|--|
| Project<br>Description           | The project includes a new paved access road crossing a creek, a<br>bottomless culvert at the road-creek crossing, a paved parking<br>lot, pickle ball courts, tennis courts, a concrete walking track, a<br>concrete plaza area, croquet courts, bocce courts, and<br>shuffleboard courts. Structures associated with the project<br>include a 25,000 square foot shed-type structure without walls<br>over some of the pickle ball courts, a shelter building, and an<br>additional small building. |  |  |
|                                  | Some areas of existing fill up to 6 feet deep.  |  |  |
| Geotechnical<br>Characterization | Interbedded Fat Clay (CH), Clayey Sand (SC), and Silty Sand (SM) to 15 feet.  |  |  |
|                                  | Groundwater was encountered at depths of 3.5 to 8.5 feet.   |  |  |
| Seismic Design                   | Site Classification is E  |  |  |
| Earthwork                        | <ul> <li>Geotechnical engineer to further evaluate areas where existing fill is present after site stripping.</li> <li>Remove Fat Clay (CH) within 3 feet of design subgrade elevations.</li> <li>On-site soils can be used for engineered fill, but Fat Clay (CH) should not be placed within 3 feet of design subgrade elevations.</li> <li>Clayey soils are sensitive to moisture variation.</li> </ul>  |  |  |
| Shallow<br>Foundations           | Shallow foundations are recommended for support of structures.<br>Allowable bearing pressure = 2,000 psf.<br>Expected settlements: < 1-inch total, < 1/2-inch differential.   |  |  |
| Pavements                        | <ul> <li>With subgrade prepared as noted in Earthwork.</li> <li>Parking area for passenger vehicles: <ul> <li>2" S9.5B asphalt over 6" ABC</li> </ul> </li> <li>Access Road: <ul> <li>2" S9.5B asphalt over 8" ABC</li> </ul> </li> </ul>   |  |  |
| General<br>Comments              | This section contains important information about the limitations of this geotechnical engineering report.  |  |  |

- 1. If the reader is reviewing this report as a pdf, the topics above can be used to access the appropriate section of the report by simply clicking on the topic itself.
- 2. This summary is for convenience only. It should be used in conjunction with the entire report for design purposes.



Gillette Athletic Complex Additions | Wilson, North Carolina January 17, 2023 | Terracon Project No. 70225204

# Introduction

This report presents the results of our subsurface exploration and Geotechnical Engineering services performed for the proposed pickleball and tennis courts to be located at the Gillette Athletic Complex at 3238 Corbett Ave NE in Wilson, North Carolina. The purpose of these services was to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Groundwater conditions
- Seismic site classification per IBC
- Site preparation and earthwork
- Dewatering considerations
- Foundation design and construction
- Floor slab design and construction
- Pavement design and construction

The geotechnical engineering Scope of Services for this project included the advancement of test borings, laboratory testing, engineering analysis, and preparation of this report.

Drawings showing the site and boring locations are shown on the **Site Location** and **Exploration Plan**, respectively. The results of the laboratory testing performed on soil samples obtained from the site during our field exploration are included on the boring logs and/or as separate graphs in the **Exploration Results** section.

# **Project Description**

Our initial understanding of the project was provided in our proposal and was discussed during project planning. A period of collaboration has transpired since the project was initiated, and our final understanding of the project conditions is as follows:

| Item                    | Description   |
|-------------------------|---|
| Information<br>Provided | An email request for proposal was provided by Leo Green with Green Engineering on September 2, 2022. The request included a site plan drawing of the layout of the planned development. |

Gillette Athletic Complex Additions | Wilson, North Carolina January 17, 2023 | Terracon Project No. 70225204



| Item                             | Description  |  |  |
|----------------------------------|--|--|--|
| Project<br>Description           | The site is located to the west and north of existing athletic<br>fields and parking lots. It is approximately 9 acres in size. The<br>project includes a new paved access road crossing a creek, a<br>bottomless culvert at the road-creek crossing, a paved parking<br>lot, pickle ball courts, tennis courts, a concrete walking track, a<br>concrete plaza area, a shelter building, croquet courts, bocce<br>courts, and shuffleboard courts.   |  |  |
| Proposed<br>Structure            | Structures associated with the project include a 25,000 square<br>foot shed-type structure without walls over some of the pickle<br>ball courts, a shelter building, an additional small building, and<br>a bottomless culvert.  |  |  |
| Building<br>Construction         | Steel frame (assumed) shed over pickle ball courts. Concrete masonry unit (CMU) block (assumed) shelter building and additional small building.  |  |  |
| Finished Floor<br>Elevation      | We have assumed design grades not more than 5 feet below or 5 feet above existing grade.   |  |  |
| Maximum Loads                    | Anticipated structural loads were not provided. In the absence<br>of information provided by the design team, we used the<br>following loads in estimating settlement based on our<br>experience with similar projects.<br>• Columns: 20 kips<br>• Walls: 1 kip per linear foot (klf)<br>• Slabs: 150 pounds per square foot (psf)<br>• Bottomless Culvert Footings: 6 kips per linear foot (klf)  |  |  |
| Grading/Slopes                   | Proposed finished grade elevations for the building pads are<br>expected to be within 5 feet of the existing ground surface.<br>We assume that approximately 5 feet of cut and 5 feet of fill will<br>be required to develop final grades, excluding remedial grading  |  |  |
| Below-Grade<br>Structures        | None None State and the state of the state o |  |  |
| Free-Standing<br>Retaining Walls | None   |  |  |



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| Item          | Description  |  |
|---------------|--|--|
| Pavements     | Entrance Road will be 8 inches of ABC with 2 inches of asphalt<br>and 24-inch concrete curb and gutter, which is the Typical<br>Section per the City of Wilson Standard Details.<br>We assume that the traffic classification for the parking lot will |  |
|               | <ul> <li>consist of:</li> <li>Class I: Parking stalls for autos and pickup trucks</li> <li>The pavement design period is 20 years.</li> </ul>  |  |
| Building Code | 2018 North Carolina  |  |

Terracon should be notified if any of the above information is inconsistent with the planned construction, as modifications to our recommendations may be necessary.

# **Site Conditions**

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

| Item   | Description   |  |
|--|---|--|
| Reveal   | The project site is located at 3238 Corbett Ave NE in Wilson, North Carolina.   |  |
| Parcel<br>Information  | 9 acres   |  |
| Information  | Latitude/Longitude (approximate) 35.7569816N, -77.9005684W<br>See Site Location   |  |
| Existing<br>Improvements   | Agricultural field with a drainage ditch. Grassed landscaped areas south of woods and west of existing softball fields. |  |
| Current Ground<br>Cover  | Ind Crops, bare ground, woods and a creek in unimproved areas   |  |
| ExistingThe ground surface at the site slopes downward from elevationTopography134 in the northeast to elevation 116 feet in the southwest |   |  |

We also collected photographs at the time of our field exploration program. A representative photo is provided in our **Photography Log**.

# **Geotechnical Characterization**

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, laboratory data, geologic setting and our

Gillette Athletic Complex Additions | Wilson, North Carolina January 17, 2023 | Terracon Project No. 70225204



understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical calculations and evaluation of the site. Conditions observed at each exploration point are indicated on the individual logs. The individual logs can be found in the **Exploration Results** and the GeoModel can be found in the **Figures** attachment of this report.

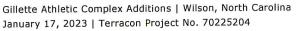
As part of our analyses, we identified the following model layers within the subsurface profile. For a more detailed view of the model layer depths at each boring location, refer to the GeoModel.

| Model<br>Layer | Layer Name                     | General Description  |
|----------------|--------------------------------|--|
| 1              | FILL                           | Very Loose Clayey Sand (SC)  |
| 2              | UPPER CLAY<br>& CLAYEY<br>SAND | Soft to Stiff Fat Clay (CH) and Loose to Medium Dense<br>Clayey Sand (SC)              |
| 3              | SILTY SAND                     | Very Loose to Medium Dense Silty Sand (SM)   |
| 4              | LOWER CLAY<br>& CLAYEY<br>SAND | Soft Silt (ML), Soft to Medium Stiff Fat Clay (CH), and<br>Very Loose Clayey Sand (SC) |

Groundwater seepage was encountered in some of the borings at depths of 3.5 to 8.5 feet at the time of our field exploration. Borehole cave-in depths of 2 to 7 feet, which are likely indicative of groundwater depths, were measured in the remaining boreholes. Groundwater conditions may be different at the time of construction. Groundwater conditions may change because of seasonal variations in rainfall, runoff, and other conditions not apparent at the time of drilling. Long-term groundwater monitoring was outside the scope of services for this project.

# **Seismic Site Class**

The seismic design requirements for buildings and other structures are based on Seismic Design Category. Site Classification is required to determine the Seismic Design Category for a structure. The Site Classification is based on the upper 100 feet of the site profile defined by a weighted average value of either shear wave velocity, standard penetration resistance, or undrained shear strength in accordance with Section 20.4 of ASCE 7 and the International Building Code (IBC). Based on the soil properties observed at the site and as described on the exploration logs and results, our professional opinion is for that a **Seismic Site Classification of E** be considered for the project. Subsurface explorations at this site were extended to a maximum depth of 15 feet. The site properties below the boring depth to 100 feet were estimated based on our experience and knowledge of geologic conditions of the general area. Additional deeper borings or





geophysical testing may be performed to confirm the conditions below the current boring depth.

# **Geotechnical Overview**

The site appears suitable for the proposed construction based upon geotechnical conditions encountered in the test borings, provided that the recommendations provided in this report are implemented in the design and construction phases of this project.

Based on the conditions encountered and estimated load-settlement relationships, the proposed structures can be supported on conventional continuous or spread footings.

Grading for the proposed foundations should incorporate the limits of the foundations plus a lateral distance beyond the outside edge of footings, where space is available. On-site soils are considered suitable to be used as engineered fill materials.

The on-site Fat Clay (CH) has high plasticity and exhibits medium to high potential for shrink-swell movements with changes in moisture. Floor slab, playing court, and pavement areas should be overexcavated as necessary and fill should be placed such that high plasticity soil is not left or placed within 3 feet of design subgrade elevations. Footing excavations should be overexcavated, as necessary, such that the footings bear on at least 2 feet of low-plasticity soil.

The near surface soils could become unstable with typical earthwork and construction traffic, especially after precipitation events. The effective drainage should be completed early in the construction sequence and maintained after construction to avoid potential issues. If possible, the grading should be performed during the warmer and drier times of the year. If grading is performed during the winter months, an increased risk for possible undercutting and replacement of unstable subgrade will persist. Additional site preparation recommendations, including subgrade improvement and fill placement, are provided in the **Earthwork** section.

Our opinion of pavement section thickness design has been developed based on our understanding of the intended use, assumed traffic, and subgrade preparation recommended herein using methodology contained in NAPA IS-109 "Design of Hot Mix Asphalt Pavements" and adjusted with consideration to local practice. The **Pavements** section includes minimum pavement component thickness.

Support of pavements on or above existing fill materials is discussed in this report. However, even with the recommended construction procedures, an inherent risk remains for the owner that compressible fill or unsuitable material, within or buried by the fill, will not be discovered. This risk of unforeseen conditions cannot be eliminated without completely removing the existing fill but can be reduced by following the

Gillette Athletic Complex Additions | Wilson, North Carolina January 17, 2023 | Terracon Project No. 70225204



recommendations contained in this report. To take advantage of the cost benefit of not removing the entire amount of undocumented fill, the owner must be willing to accept the risk of increased differential performance which can result in increased cracking and abrupt differential settlement. Should this risk be acceptable, pavements can be supported above the existing fill.

The recommendations contained in this report are based upon the results of field and laboratory testing (presented in the **Exploration Results**), engineering analyses, and our current understanding of the proposed project. The **General Comments** section provides an understanding of the report limitations.

# Earthwork

Earthwork is anticipated to include clearing and grubbing, excavations, and engineered fill placement. The following sections provide recommendations for use in the preparation of specifications for the work. Recommendations include critical quality criteria, as necessary, to render the site in the state considered in our geotechnical engineering evaluation for foundations, floor slabs, playing courts, and pavements.

#### Site Preparation

Prior to placing fill, existing vegetation, topsoil, cultivated soil, and rootmat should be removed. Complete stripping of the topsoil, cultivated soil, and rootmat should be performed in the proposed construction areas.

Mature trees are located within or near the footprint of some of the proposed site features, which will require removal at the onset of construction. Where trees are removed, the full root ball should be removed.

Where fill is placed on existing slopes steeper than 5H:1V, benches should be cut into the existing slopes prior to fill placement. The benches should have a minimum vertical face height of 1 foot and a maximum vertical face height of 3 feet and should be cut wide enough to accommodate the compaction equipment. This benching will help provide a positive bond between the fill and natural soils and reduce the possibility of failure along the fill/natural soil interface.

If unexpected fills or underground facilities are encountered, such features should be removed, and the excavation thoroughly cleaned prior to backfill placement and/or construction.

Gillette Athletic Complex Additions | Wilson, North Carolina January 17, 2023 | Terracon Project No. 70225204

# Ferracon

### Subgrade Preparation

On-site Fat Clay (CH) beneath proposed slabs, playing courts, and pavements should be removed to a depth of 3 feet beneath proposed the slab, playing court, or pavement section design subgrade, or existing grade, whichever is greater.

The subgrade should be proofrolled with an adequately loaded vehicle (20 tons minimum) such as a fully-loaded tandem-axle or tri-axle dump truck. The proofrolling should be performed under the observation of the Geotechnical Engineer or representative. Areas excessively deflecting or considered unstable under the proofroll should be delineated and subsequently addressed by the Geotechnical Engineer. Such areas should either be removed or modified by treating/applying/mixing with lime or cement. Excessively wet or dry material should either be removed or moisture conditioned and recompacted.

Compacted structural fill soils should then be placed to the proposed design grade and the moisture content and compaction of subgrade soils should be maintained until foundation or pavement construction.

Based upon the subsurface conditions determined from the geotechnical exploration, subgrade soils exposed during construction are anticipated to be relatively difficult to work. The workability of the subgrade may be affected by precipitation, repetitive construction traffic or other factors. If unworkable conditions develop, workability may be improved by scarifying and drying.

### **Existing Fill**

As noted in **Geotechnical Characterization**, Boring B-01 encountered previously placed fill to a depth of approximately 6 feet with very low N-values. We have no records to indicate the degree of fill placement control, and consequently, the fill is considered unreliable for support of pavements. Support of pavements on or above existing fill soils is discussed in this report. However, even with the recommended construction procedures, inherent risk exists for the owner that compressible fill or unsuitable material, within or buried by the fill will, not be discovered. This risk of unforeseen conditions cannot be eliminated without completely removing the existing fill but can be reduced by following the recommendations contained in this report.

If the owner elects to construct pavements on the existing fill, the following protocol should be followed. Once the planned subgrade elevation has been reached, the entire pavement area should be proofrolled. Areas of soft or otherwise unsuitable material should be evaluated by test pits and/or hand auger borings with DCP testing, then stabilized as recommended later in this report.

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#### Excavation

We anticipate that excavations for the proposed construction can be accomplished with conventional earthmoving equipment. The bottom of excavations should be thoroughly cleaned of loose soils and disturbed materials prior to backfill placement and/or construction.

### Permanent Site Dewatering

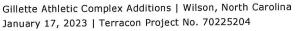
**Management of Shallow Groundwater:** Since design grades are not known at this time, permanent site dewatering of the shallow groundwater in the proposed building, playing court, and pavement areas may or may not be necessary. Raising site grades above the existing ground surface could eliminate the need for permanent dewatering, such as French drains or blanket drains. Once a preliminary grading plan has been prepared, it should be provided to Terracon for review and comment regarding the need permanent dewatering of the shallow groundwater at the site.

**Drainage Feature:** A drainage feature is present in the eastern part of the site in the proposed tennis court areas. The drainage feature flows from north to south. We recommend that a French drain be installed in this area prior to filling. A typical French drain would consist of an 18- to 24-inch-wide by 18- to 24-inch-tall bed of AASHTO Size No. 57 Stone wrapped in a medium duty, non-woven filter fabric and containing a 6-inch diameter, Schedule 40 PVC perforated pipe. Actual dimensions should be as determined necessary by Terracon during construction. However, the top of the drain should be positioned at least 18 inches below design playing court subgrade elevations. The French drain should be sloped at a minimum of 0.5% and should be daylighted to drain into the creek or the site's permanent stormwater system.

### Soil Stabilization

Soft or very loose near-surface soils were encountered in Borings B-01, B-08, and B-09. Stabilization of these soils will likely be required prior to fill placement or overlying construction in these areas.

Methods of subgrade improvement, as described below, could include scarification, moisture conditioning and recompaction, removal of unstable materials and replacement with granular fill (with or without geosynthetics), and chemical stabilization. The appropriate method of improvement, if required, would be dependent on factors such as schedule, weather, the size of area to be stabilized, and the nature of the instability. More detailed recommendations can be provided during construction as the need for subgrade stabilization occurs. Performing site grading operations during warm seasons and dry periods would help reduce the amount of subgrade stabilization required.



If the exposed subgrade is unstable during proofrolling operations, it could be stabilized using one of the methods outlined below.

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- Scarification and Recompaction It may be feasible to scarify, dry, and recompact the exposed soils. The success of this procedure would depend primarily upon favorable weather and sufficient time to dry the soils. Stable subgrades likely would not be achievable if the thickness of the unstable soil is greater than about 1 foot, if the unstable soil is at or near groundwater levels, or if construction is performed during a period of wet or cool weather when drying is difficult.
- Crushed Stone/Processed Fill The use of crushed stone or processed fill (i.e., screenings) is a common procedure to improve subgrade stability. Typical undercut depths would be expected to range from about 12 to 24 inches below finished subgrade elevation. The use of high modulus geotextiles (i.e., engineering fabric or geogrid) could also be considered after underground work such as utility construction is completed. Prior to placing the fabric or geogrid, we recommend that all below grade construction, such as utility line installation, be completed to avoid damaging the fabric or geogrid. Equipment should not be operated above the fabric or geogrid until one full lift of crushed stone fill is placed above it. The maximum particle size of granular material placed over geotextile fabric or geogrid should not exceed 1-1/2 inches.
- Chemical Modification Improvement of subgrades with Portland cement or lime could be considered for improving unstable soils. Chemical modification should be performed by a pre-qualified contractor having experience with successfully stabilizing subgrades in the project area on similar sized projects with similar soil conditions. Results of chemical analysis of the additive materials should be provided to the geotechnical engineer prior to use. The hazards of chemicals blowing across the site or onto adjacent property should also be considered. Additional testing would be needed to develop specific recommendations to improve subgrade stability by blending chemicals with the site soils. Additional testing could include, but not be limited to, determining the most suitable stabilizing agent and the optimum amounts required.

Further evaluation of the need and recommendations for subgrade stabilization can be provided during construction as the geotechnical conditions are exposed.

#### Fill Material Types

Fill required to achieve design grade should be classified as structural fill and general fill. Structural fill is material used below, or within 10 feet of structures, playing courts, pavements or constructed slopes. General fill is material used to achieve grade outside of these areas.

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**Reuse of On-Site Soil:** Excavated on-site soil may be selectively reused as fill. Portions of the on-site soil have an elevated fines content, are highly plastic, will be sensitive to moisture conditions (particularly during seasonally wet periods), and may not be suitable for reuse when above optimum moisture content. The on-site Fat Clay (CH) has high plasticity (PI>30) and a medium to high expansion potential. Fat Clay (CH) should not be used as structural fill within 3 feet of design subgrade elevations.

Material property requirements for on-site soil for use as general fill and structural fill are noted in the table below:

| Property   | General Fill                    | Structural Fill                                    |
|--|---------------------------------|--|
| Composition  | Free of deleterious<br>material | Free of deleterious material                       |
|  | 6 inches                        |  |
| Maximum particle size                                  | (or 2/3 of the lift thickness)  | 3 inches   |
| Fines content  | Not limited                     | Not limited  |
| Plasticity   | Not limited                     | Maximum plasticity index of 30 in the upper 3 feet |
| GeoModel Layer<br>Expected to be Suitable <sup>1</sup> | 1, 2, 3, 4                      | 1, 2, 3, 4   |

1. Based on subsurface exploration. Actual material suitability should be determined in the field at time of construction.

**Imported Fill Materials:** Imported fill materials should meet the following material property requirements. Regardless of its source, compacted fill should consist of approved materials that are free of organic matter and debris. Frozen material should not be used, and fill should not be placed on a frozen subgrade.

| Soil Type <sup>1</sup>               | USCS<br>Classification            | Acceptable Parameters (for Structural<br>Fill)  |
|--------------------------------------|-----------------------------------|---|
| Low Plasticity<br>Fine Grained       | CL, CL-ML<br>ML, SM, SC           | Liquid Limit less than 50<br>Plasticity index less than 30  |
| Coarse Grained                       | GW, GP, GM, GC,<br>SW, SP, SM, SC | Less than 50% passing No. 200 sieve<br>Liquid Limit less than 50<br>Plasticity index less than 30 |
| Select Granular<br>Fill <sup>2</sup> | SP, SP-SM, SW, or<br>SW-SM        | Less than 12% passing No. 200 sieve   |

Minimum

Compaction

Requirements 1,2,3

Water Content

Range<sup>1</sup>

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| Coll Type 1            | USCS           | Acceptable Parameters (for Structural |
|------------------------|----------------|---------------------------------------|
| Soil Type <sup>1</sup> | Classification | Fill)                                 |

- Structural and general fill should consist of approved materials free of organic matter and debris. Frozen material should not be used, and fill should not be placed on a frozen subgrade. A sample of each material type should be submitted to the Geotechnical Engineer for evaluation prior to use on this site. Additional geotechnical consultation should be provided prior to use of uniformly graded gravel (GP) on the site.
- NCDOT Class II, Type 1 Select Material. Manufactured materials such as processed fill (i.e., screenings) meeting this specification can be used.

### Fill Placement and Compaction Requirements

court subgrades

subgrades

optimum

optimum

ItemStructural FillGeneral Fill8 inches or less in loose thickness when<br/>heavy, self-propelled compaction equipment<br/>is used8 inches in loose thickness when<br/>heavy, self-propelled compaction equipment<br/>is usedSame as<br/>structural fill4 to 6 inches in loose thickness when hand-<br/>guided equipment (i.e. jumping jack or<br/>plate compactor) is usedSame as<br/>structural fill98% of max. below foundations and within<br/>1 foot of finished pavement and playingSame as<br/>structural fill

95% of max. above foundations, below

floor slabs, and more than 1 foot below finished pavement and playing court

Structural and general fill should meet the following compaction requirements.

| 1. | Maximum density and optimum water content as determined by the standard Proctor |
|----|---|
|    | test (ASTM D 698).  |

Coarse grained: -3% to +3% of optimum

Low plasticity fine grained: -2% to +3% of

High plasticity fine grained: 0 to +4% of

- 2. High plasticity fine grained fill should not be compacted to more than 100% of standard Proctor maximum dry density.
- 3. Materials not amenable to density testing should be placed and compacted to a stable condition observed by the Geotechnical Engineer or representative.

92% of max.

As required to

achieve min.

requirements

compaction

erracon

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### Grading and Drainage

All grades must provide effective drainage away from the structures during and after construction and should be maintained throughout the life of the structures. Water retained next to the structures can result in soil movements greater than those discussed in this report. Greater movements can result in unacceptable differential floor slab, playing court, and/or foundation movements, cracked slabs, playing surfaces, and walls, and roof leaks. The roofs should have gutters/drains with downspouts that discharge onto splash blocks at a distance of at least 10 feet from the buildings.

Exposed ground should be sloped and maintained at a minimum 5% away from the structures and playing courts for at least 10 feet beyond their perimeters. Locally, flatter grades may be necessary to transition ADA access requirements for flatwork. After construction and landscaping have been completed, final grades should be verified to document effective drainage has been achieved. Grades around the facilities should also be periodically inspected and adjusted, as necessary, as part of the facilities' maintenance program. Where paving or flatwork abuts a structure, a maintenance program should be established to effectively seal and maintain joints and prevent surface water infiltration.

### Earthwork Construction Considerations

Shallow excavations for the project are anticipated to be accomplished with conventional construction equipment. Upon completion of filling and grading, care should be taken to maintain the subgrade water content prior to construction of grade-supported improvements such as floor slabs, playing courts, and pavements. Construction traffic over the completed subgrades should be avoided. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. Water collecting over or adjacent to construction areas should be removed. If the subgrade freezes, desiccates, saturates, or is disturbed, the affected material should be removed, or the materials should be scarified, moisture conditioned, and recompacted prior to subsequent construction.

The groundwater table could affect overexcavation efforts, especially for overexcavation and replacement of lower strength soils. A temporary dewatering system consisting of sumps with pumps may be necessary to achieve the recommended depth of overexcavation depending on groundwater conditions at the time of construction.

Water and shallow groundwater in existing creek and drainage feature areas could affect fill placement efforts and performance in these areas. If surface water and/or shallow groundwater are present in these areas at the time of construction, a dewatering system consisting of French drains may be necessary to achieve the required to achieve subgrade and fill stability.

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As a minimum, excavations should be performed in accordance with OSHA 29 CFR, Part 1926, Subpart P, "Excavations" and its appendices, and in accordance with any applicable local and/or state regulations.

Construction site safety is the sole responsibility of the contractor who controls the means, methods, and sequencing of construction operations. Under no circumstances shall the information provided herein be interpreted to mean Terracon is assuming responsibility for construction site safety or the contractor's activities; such responsibility shall neither be implied nor inferred.

Excavations or other activities resulting in ground disturbance have the potential to affect adjoining properties and structures. Our scope of services does not include review of available final grading information or consider potential temporary grading performed by the contractor for potential effects such as ground movement beyond the project limits. A preconstruction/ precondition survey should be conducted to document nearby property/infrastructure prior to any site development activity. Excavation or ground disturbance activities adjacent or near property lines should be monitored or instrumented for potential ground movements that could negatively affect adjoining property and/or structures.

### Construction Observation and Testing

The earthwork efforts should be observed by the Geotechnical Engineer (or others under their direction). Observation should include documentation of adequate removal of surficial materials (vegetation, topsoil, and cultivated soil), evaluation and remediation of existing fill materials, as well as proofrolling and mitigation of unsuitable areas delineated by the proofrolls.

Each lift of compacted fill should be tested, evaluated, and reworked, as necessary, as recommended by the Geotechnical Engineer prior to placement of additional lifts. Each lift of fill should be tested for density and water content at a frequency of at least one test for every 2,500 square feet of compacted fill in the building and playing court areas and 5,000 square feet in pavement areas. Where not specified by local ordinance, one density and water content test should be performed for every 100 linear feet of compacted utility trench backfill and a minimum of one test performed for every 12 vertical inches of compacted backfill.

In areas of foundation excavations, the bearing subgrade should be evaluated by the Geotechnical Engineer. A representative of the geotechnical engineer should use a combination of hand auger borings and dynamic cone penetrometer (DCP) testing to determine the suitability of the bearing materials for the design bearing pressure. DCP testing should be performed to a depth of 3 to 5 feet below the bottom of foundation excavation. If existing fill is found below the proposed foundation the hand auger and DCP

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testing should extended to natural soils. If unanticipated conditions are observed, the Geotechnical Engineer should recommend mitigation options.

In addition to the documentation of the essential parameters necessary for construction, the continuation of the Geotechnical Engineer into the construction phase of the project provides the continuity to maintain the Geotechnical Engineer's evaluation of subsurface conditions, including assessing variations and associated design changes.

# **Shallow Foundations**

The proposed shed-type structure over some of the pickle ball courts, the shelter building, the additional small building, and the bottomless culvert can be supported by shallow foundations. If the site has been prepared in accordance with the requirements noted in **Earthwork**, the following design parameters are applicable for shallow foundations.

### Design Parameters – Compressive Loads

| Item   | Description  |
|--|--|
| Maximum Net Allowable Bearing<br>Pressure <sup>1, 2</sup>                | 2,000 psf  |
| Required Bearing Stratum <sup>3</sup>                                    | Undisturbed non-plastic, low-plasticity, or<br>medium-plasticity native soils or structural<br>fill. Footing excavations should be<br>overexcavated, as necessary, such that the<br>footings bear on at least 2 feet of non-<br>plastic, low-plasticity, or medium-plasticity<br>soil. |
| Minimum Foundation Dimensions  | Per 2018 North Carolina Building Code  |
| Ultimate Passive Resistance <sup>4</sup><br>(equivalent fluid pressures) | 200 pcf (cohesive backfill)  |
| Sliding Resistance <sup>5</sup>  | 130 psf allowable cohesion<br>(native/structural fill clay)  |
| Minimum Embedment below<br>Finished Grade <sup>6</sup>                   | 12 inches  |
| Estimated Total Settlement from<br>Structural Loads <sup>2</sup>         | Less than about 1 inch   |
| Estimated Differential Settlement <sup>2, 7</sup>                        | About 1/2 of total settlement  |

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Item



#### Description

- 1. The maximum net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. Values assume that exterior grades are no steeper than 20% within 10 feet of structure.
- Values provided are for maximum loads noted in Project Description. Additional geotechnical consultation will be necessary if higher loads are anticipated.
- 3. Unsuitable or soft soils should be overexcavated and replaced per the recommendations presented in **Earthwork**.
- 4. Use of passive earth pressures require the sides of the excavation for the spread footing foundation to be nearly vertical and the concrete placed neat against these vertical faces or that the footing forms be removed and compacted structural fill be placed against the vertical footing face. Assumes no hydrostatic pressure.
- 5. Can be used to compute sliding resistance where foundations are placed on suitable soil/materials. Frictional resistance for granular materials is dependent on the bearing pressure which may vary due to load combinations. For fine-grained materials, lateral resistance using cohesion should not exceed ½ the dead load.
- 6. Embedment necessary to minimize the effects of frost. For sloping ground, maintain depth below the lowest adjacent exterior grade within 5 horizontal feet of the structure.
- 7. Differential settlements are noted for equivalent-loaded foundations and bearing elevation as measured over a span of 50 feet.

### Design Parameters – Overturning and Uplift Loads

Shallow foundations subjected to overturning loads should be proportioned such that the resultant eccentricity is maintained in the center-third of the foundation (e.g., e < b/6, where b is the foundation width). This requirement is intended to keep the entire foundation area in compression during the extreme lateral/overturning load event. Foundation oversizing may be required to satisfy this condition.

Uplift resistance of spread footings can be developed from the effective weight of the footing and the overlying soils with consideration to the IBC basic load combinations.

| Item                                      | Description  |
|---|--|
| Soil Moist Unit Weight                    | 115 pcf  |
| Soil Effective Unit Weight <sup>1</sup>   | 53 pcf   |
| Soil weight included in uplift resistance | Soil included within the prism extending up from<br>the top perimeter of the footing vertically to<br>ground surface |

1. Effective (or buoyant) unit weight should be used for soil above the foundation level and below a water level. The high groundwater level should be used in uplift design as applicable.



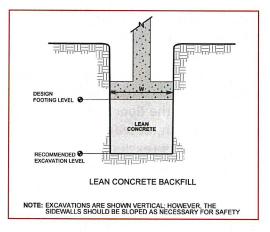
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### Foundation Construction Considerations

As noted in **Earthwork**, the footing excavations should be evaluated under the observation of the Geotechnical Engineer. The base of all foundation excavations should be free of water and loose soil, prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing soil disturbance. Care should be taken to prevent wetting or drying of the bearing materials during construction. Excessively wet or dry material or any loose/disturbed material in the bottom of the footing excavations should be removed/reconditioned before foundation concrete is placed.

Sensitive soils exposed at the surface of footing excavations may require surficial compaction with hand-held dynamic compaction equipment prior to placing structural fill, steel, and/or concrete. Should surficial compaction not be adequate, construction of a working surface consisting of either crushed stone or a lean concrete mud mat may be required prior to the placement of reinforcing steel and construction of foundations.

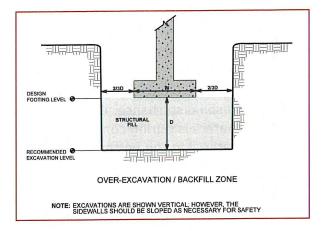
If unsuitable bearing soils are observed at the base of the planned footing excavation, the excavation should be extended deeper to suitable soils, and the footings could bear directly on these soils at the lower level or on lean concrete backfill placed in the excavations. The lean concrete replacement zone is illustrated on the sketch below.



Overexcavation for structural fill placement below footings should be conducted as shown below. The overexcavation should be backfilled up to the footing base elevation with structural fill placed as recommended in the **Earthwork** section. If poorly-graded gravel (e.g., GP, No. 57 stone, or No. 67 stone) is used, it should be wrapped in a woven geotextile.



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# Floor Slabs and Playing Courts

Design parameters for floor slabs and playing courts assume the requirements for **Earthwork** have been followed. Specific attention should be given to positive drainage away from the floor slabs and playing courts, and positive drainage of the aggregate base beneath the floor slabs and playing courts.

The on-site soils include high plasticity clays (CH) exhibiting the potential to swell with increased water content and shrink upon drying. Construction of the floor slabs and playing courts, in addition to revising site drainage, creates the potential for gradual changes in water contents within the clays. Increases in water content will cause the clays to swell and damage the floor slabs and playing courts. Drying of the clays will cause the clays to shrink and damage the floor slabs and playing courts. To reduce the swell potential to less than about 1 inch, at least the upper 3 feet of subgrade soils below the floor slabs and playing courts (excluding the aggregate base course) should consist of low- to medium-plasticity clay (CL), low- to medium-plasticity clayey sand (SC with PI<30), or silty sand (SM).

Due to the potential for significant moisture fluctuations of subgrade material beneath floor slabs supported at-grade, the Geotechnical Engineer should evaluate the material within 3 feet of the floor slab and playing court subgrades immediately prior to placement of additional fill or floor slabs.

Depending upon the finished floor elevations and location at the site, unsuitable, weak, high plasticity (PI>30), and/or soft to medium stiff soils may be observed at the floor slab and playing court subgrade levels. These soils should be replaced with non-plastic, low-plasticity, or medium-plasticity structural fill so the floor slabs and playing courts are supported on at least 3 feet of compacted non-plastic, low-plasticity, or medium-plasticity structural fill.

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# Ferracon

#### Floor Slab and Playing Court Design Parameters

| Item  | Description   |  |
|---|---|--|
|   | Use 4 inches of base course meeting material specifications of<br>ACI 302 and the 2018 North Carolina Building Code.<br>The base course material should consist of compactible, easy-<br>to-trim, granular fill that will remain stable and support<br>construction traffic. Suitable materials include SP, SW, and<br>SM. Well-graded gravel (GW or ABC) can also be used <sup>3</sup> . |  |
| Floor Slab/Playing<br>Court Support <sup>1</sup>          |   |  |
|   | Subgrade compacted to recommendations in Earthwork  |  |
| Estimated Modulus<br>of Subgrade<br>Reaction <sup>2</sup> | 150 pounds per square inch per inch (psi/in) for point loads  |  |
|   | ld be structurally independent of building footings or walls to reduce the<br>or slab cracking caused by differential movements between the slab and  |  |
|   | rade reaction is an estimated value based upon our experience with the on, the requirements noted in <b>Earthwork</b> , and the floor slab support as   |  |

- subgrade condition, the requirements noted in **Earthwork**, and the floor slab support as noted in this table. It is provided for point loads. For large area loads the modulus of subgrade reaction would be lower.
- 3. Per ACI 360R-12, these materials produce more uniform support and provide an allweather working surface to speed construction during inclement weather.

The use of a vapor retarder should be considered beneath concrete slabs on grade covered with wood, tile, carpet, or other moisture sensitive or impervious coverings, when the project includes humidity-controlled areas, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder.

Saw-cut contraction joints should be placed in the floor slabs to help control the location and extent of cracking. For additional recommendations, refer to the ACI Design Manual. Joints or cracks should be sealed with a waterproof, non-extruding compressible compound specifically recommended for heavy duty concrete pavement and wet environments.

Where floor slabs are tied to perimeter walls or turn-down slabs to meet structural or other construction objectives, our experience indicates differential movement between the walls and slabs will likely be observed in adjacent slab expansion joints or floor slab cracks beyond the length of the structural dowels. The Structural Engineer should

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account for potential differential settlement through use of sufficient control joints, appropriate reinforcing or other means.

### Floor Slab and Playing Court Construction Considerations

Finished subgrade, within and for at least 10 feet beyond the floor slabs and playing courts, should be protected from traffic, rutting, or other disturbance and maintained in a relatively moist condition until floor slabs and playing courts are constructed. If the subgrade should become damaged or desiccated prior to construction of floor slabs and playing courts, the affected material should be removed, and structural fill should be added to replace the resulting excavation. Final conditioning of the finished subgrade should be performed immediately prior to placement of the floor slab or playing court support course.

The Geotechnical Engineer should observe the condition of the floor slab and playing court subgrades immediately prior to placement of the base course. Attention should be paid to high traffic areas that were rutted and disturbed earlier, and to areas where backfilled trenches are located.

### **Pavements**

### **General Pavement Comments**

Pavement designs are provided for the traffic conditions and pavement life conditions as noted in **Project Description** and in the following sections of this report. A critical aspect of pavement performance is site preparation. Pavement designs noted in this section must be applied to the site which has been prepared as recommended in the **Earthwork** section.

#### **Pavement Design Parameters**

A California Bearing Ratio (CBR) of 4 was used for the subgrade for the asphaltic concrete (AC) pavement designs. This value was based on the laboratory test results, our experience with similar projects, and our expectation of the quality of the subgrade as prescribed by the **Site Preparation** conditions as outlined in **Earthwork**.

### Pavement Section Thicknesses

The following table provides our opinion of minimum thickness for AC sections:

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# **Ferracon**

#### Asphaltic Concrete Design

| Layer                                | Thickness (inches)                      |   |  |
|--------------------------------------|---|---|--|
|                                      | Traffic Class I <sup>1</sup>            | Entrance Road   |  |
| AC Surface<br>Course <sup>2, 3</sup> | e in clear of 2 deciments of the second | n and wola of boor <sub>2</sub> for state software<br>in foomevolution that the total and the |  |
| Aggregate Base                       | 6                                       | n iso a lon tin <mark>8</mark> the bos pairs i  |  |

- 1. See **Project Description** for more specifics regarding traffic assumptions.
- 2. All materials should meet the current North Carolina Department of Transportation (NCDOT) Standard Specifications for Highway and Bridge Construction.
  - Asphaltic Surface NCDOT Type S9.5B Asphaltic Cement Concrete: Section 600
- 3. Placed in two equal-thickness lifts.

Areas for parking of heavy vehicles, concentrated turn areas, and start/stop maneuvers could require thicker pavement sections. Edge restraints (i.e. concrete curbs or aggregate shoulders) should be planned along curves and areas of maneuvering vehicles.

Openings in pavements, such as decorative landscaped areas, are sources for water infiltration into surrounding pavement systems. Water can collect in the islands and migrate into the surrounding subgrade soils thereby degrading support of the pavement. Islands with raised concrete curbs, irrigated foliage, and low permeability near-surface soils are particular areas of concern. The civil design for the pavements with these conditions should include features to restrict or collect and discharge excess water from the islands. Examples of features are edge drains connected to the stormwater collection system, longitudinal subdrains, or other suitable outlets and impermeable barriers preventing lateral migration of water such as a cutoff wall installed to a depth below the pavement structure.

#### Pavement Drainage

Pavements should be sloped to provide rapid drainage of surface water. Water allowed to pond on or adjacent to the pavements could saturate the subgrade and contribute to premature pavement deterioration. In addition, the pavement subgrade should be graded to provide positive drainage within the granular base section. Appropriate sub-drainage or connection to a suitable daylight outlet should be provided to remove water from the granular subbase.



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### **Pavement Maintenance**

The pavement sections represent minimum recommended thicknesses and, as such, periodic upkeep should be anticipated. Preventive maintenance should be planned and provided for through an on-going pavement management program. Maintenance activities are intended to slow the rate of pavement deterioration and to preserve the pavement investment. Pavement care consists of both localized (e.g., crack and joint sealing and patching) and global maintenance (e.g., surface sealing). Additional engineering consultation is recommended to determine the type and extent of a cost-effective program. Even with periodic maintenance, some movements and related cracking may still occur, and repairs may be required.

Pavement performance is affected by its surroundings. In addition to providing preventive maintenance, the civil engineer should consider the following recommendations in the design and layout of pavements:

- Final grade adjacent to paved areas should slope down from the edges at a minimum 2%.
- Subgrade and pavement surfaces should have a minimum 2% slope to promote proper surface drainage.
- Install pavement drainage systems surrounding areas anticipated for frequent wetting.
- Install joint sealant and seal cracks immediately.
- Seal all landscaped areas in or adjacent to pavements to reduce moisture migration to subgrade soils.
- Place compacted, low permeability backfill against the exterior side of curb and gutter.
- Place curb, gutter and/or sidewalk directly on clay subgrade soils rather than on unbound granular base course materials.

# **General Comments**

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

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Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no thirdparty beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly affect excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety and cost estimating including excavation support and dewatering requirements/design are the responsibility of others. Construction and site development have the potential to affect adjacent properties. Such impacts can include damages due to vibration, modification of groundwater/surface water flow during construction, foundation movement due to undermining or subsidence from excavation, as well as noise or air quality concerns. Evaluation of these items on nearby properties are commonly associated with contractor means and methods and are not addressed in this report. The owner and contractor should consider a preconstruction/precondition survey of surrounding development. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

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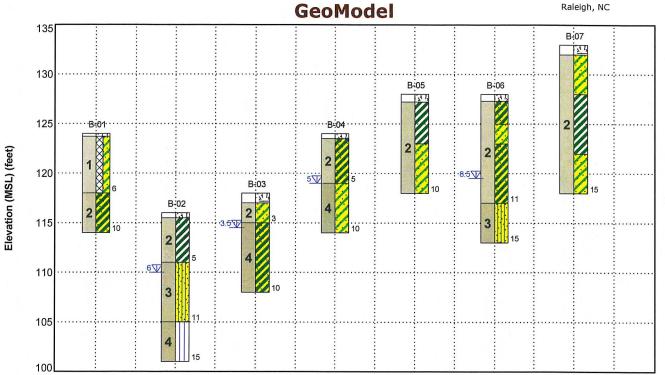
# **Figures**

#### **Contents:**

GeoModel (2 pages)

Facilities | Environmental | Geotechnical | Materials





This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

| Model Layer | Layer Name                  | General Description  |
|-------------|-----------------------------|--|
| 1           | FILL                        | Very Loose Clayey Sand (SC)  |
| 2           | UPPER CLAY &<br>CLAYEY SAND | Soft to Stiff Fat Clay (CH) and Loose to Medium Dense<br>Clayey Sand (SC)              |
| 3           | SILTY SAND                  | Very Loose to Medium Dense Silty Sand (SM)   |
| 4           | LOWER CLAY &<br>CLAYEY SAND | Soft Silt (ML), Soft to Medium Stiff Fat Clay (CH), and Very<br>Loose Clayey Sand (SC) |

Clayey Sand

Fat Clay

LEGEND

☑ First Water Observation

✓ Second Water Observation

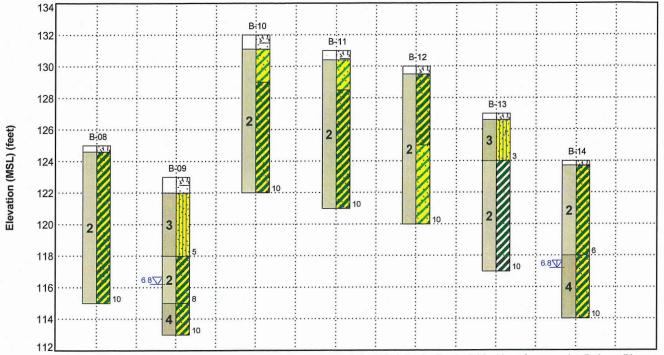
The groundwater levels shown are representative of the date and time of our exploration. Significant changes are possible over time. Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

NOTES:

Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project. Numbers adjacent to soil column indicate depth below ground surface.



## GeoModel



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

| Model Layer | Layer Name                  | General Description  |
|-------------|-----------------------------|--|
| 1           | FILL                        | Very Loose Clayey Sand (SC)  |
| 2           | UPPER CLAY &<br>CLAYEY SAND | Soft to Stiff Fat Clay (CH) and Loose to Medium Dense<br>Clayey Sand (SC)              |
| 3           | SILTY SAND                  | Very Loose to Medium Dense Silty Sand (SM)   |
| 4           | LOWER CLAY &<br>CLAYEY SAND | Soft Silt (ML), Soft to Medium Stiff Fat Clay (CH), and Very<br>Loose Clayey Sand (SC) |

LEGEND

Topsoil Sandy Fat Clay

Clayey Sand

V First Water Observation

#### V Second Water Observation

NOTES:

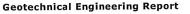
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project. Numbers adjacent to soil column indicate depth below ground surface.

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Gillette Athletic Complex Additions | Wilson, North Carolina January 17, 2023 | Terracon Project No. 70225204



# Attachments



Gillette Athletic Complex Additions | Wilson, North Carolina January 17, 2023 | Terracon Project No. 70225204

## Ferracon

## **Exploration and Testing Procedures**

### **Field Exploration**

| Number of Borings | Approximate Boring<br>Depth (feet) | Location                   |
|-------------------|------------------------------------|----------------------------|
| 14                | 10 to 15                           | Pavements/buildings/courts |

**Boring Layout and Elevations:** Terracon personnel provided the boring layout using handheld GPS equipment (estimated horizontal accuracy of about  $\pm 10$  feet) and referencing existing site features. Approximate ground surface elevations were estimated using information obtained from the Wilson County GIS website. If elevations and a more precise boring layout are desired, we recommend borings be surveyed.

**Subsurface Exploration Procedures:** We advanced the borings with a track-mounted rotary drill rig using continuous flight augers (hollow stem). Four samples were obtained in the upper 10 feet of each boring and at intervals of 5 feet thereafter. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon was driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. For safety purposes, all borings were backfilled with auger cuttings after their completion. Pavements were patched with coldmix asphalt and/or pre-mixed concrete, as appropriate.

We also observed the boreholes while drilling and at the completion of drilling for the presence of groundwater. The groundwater levels are shown on the attached boring logs.

The sampling depths, penetration distances, and other sampling information was recorded on the field boring logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a Geotechnical Engineer. Our exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials observed during drilling and our interpretation of the subsurface conditions between samples. Final boring logs were prepared from the field logs. The final boring logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

#### **Geotechnical Engineering Report**

Gillette Athletic Complex Additions | Wilson, North Carolina January 17, 2023 | Terracon Project No. 70225204

# **Ferracon**

### Laboratory Testing

The project engineer reviewed the field data and assigned laboratory tests. The laboratory testing program included the following types of tests:

- Moisture Content
- Atterberg Limits
- Grain Size Analysis
- Standard Proctor Moisture-Density
- California Bearing Ratio

The laboratory testing program often included examination of soil samples by an engineer. Based on the results of our field and laboratory programs, we described and classified the soil samples in accordance with the Unified Soil Classification System.





Gillette Athletic Complex Additions | Wilson, North Carolina January 17, 2023 | Terracon Project No. 70225204

# **Photography Log**



#### Geotechnical Engineering Report

Gillette Athletic Complex Additions | Wilson, North Carolina January 17, 2023 | Terracon Project No. 70225204



# **Site Location and Exploration Plans**

#### **Contents:**

Site Location Plan Exploration Plan

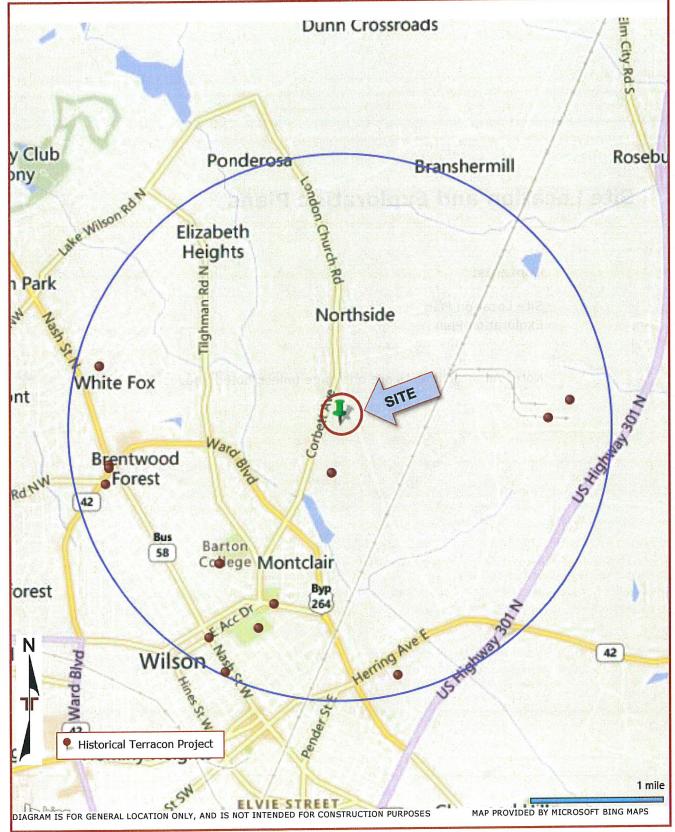
Note: All attachments are one page unless noted above.

#### **Geotechnical Engineering Report**

Gillette Athletic Complex Additions | Wilson, North Carolina January 17, 2023 | Terracon Project No. 70225204



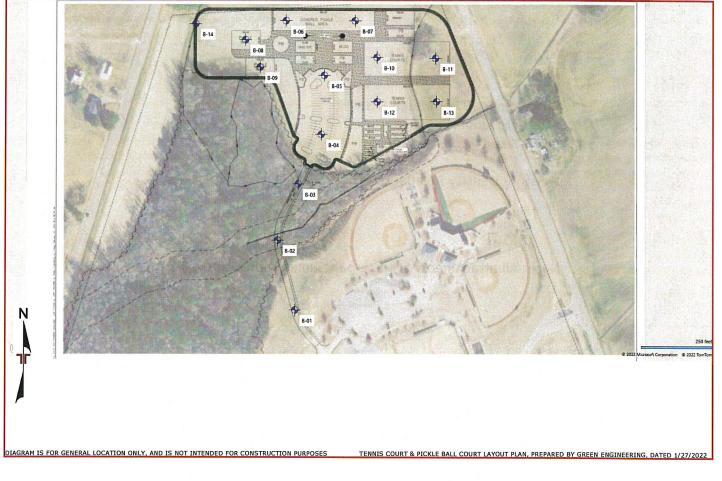
### **Site Location**



Geotechnical Engineering Report Gillette Athletic Complex Additions | Wilson, North Carolina January 17, 2023 | Terracon Project No. 70225204

# **Ferracon**

### **Exploration Plan (Landscape)**



# **Exploration and Laboratory Results**

### **Contents:**

Boring Logs (B-1 through B-14) Atterberg Limits Grain Size Distribution CBR Moisture Density Relationship

Note: All attachments are one page unless noted above.



## Boring Log No. B-01

| 2           |         |  |                          | -      |     |       |              | -  |                                       | a.      |
|-------------|---------|--|--------------------------|--------|-----|-------|--------------|----|---------------------------------------|---------|
|             |         | 10.0   | 114                      | - 10-  |     | X     | 3-2-4<br>N=6 |    | ÷                                     |         |
|             | -       | Boring Terminated at 10 Feet   |                          | 10     |     |       |              |    |                                       |         |
|             |         |  | 5                        |        |     |       |              |    |                                       |         |
| -           | 8       |  |                          |        |     |       |              |    |                                       |         |
|             | -       |  |                          |        |     |       |              |    |                                       |         |
|             |         |  | •                        |        |     |       |              |    |                                       |         |
|             |         |  |                          |        | e . |       |              |    |                                       |         |
|             | 2       |  |                          |        |     |       |              |    |                                       | 4       |
|             |         |  |                          |        |     |       |              |    |                                       |         |
|             |         |  |                          |        | E1  |       |              | 81 |                                       | -       |
|             |         |  |                          |        |     |       |              |    |                                       | ž.      |
|             |         |  |                          |        |     |       |              |    |                                       |         |
|             | P.)     |  |                          | -      |     |       |              |    |                                       |         |
|             |         |  | -81                      |        |     |       |              |    |                                       | e * 1   |
|             |         |  |                          | 6      | 3   |       |              |    |                                       | 6 P - 1 |
|             |         |  |                          |        |     |       |              |    |                                       |         |
| See         | Explora | ation and Testing Procedures for a description of field and laboratory Wal<br>used and additional data (If any). | ter Level Ob<br>Groundwa |        |     | ntere | 4            |    | Drill Rig<br>Geoprobe 323             |         |
|             |         | ting Information for explanation of symbols and abbreviations.   | C. Cund Md               |        |     |       |              |    | Hammer Type<br>Automatic              |         |
|             |         |  |                          |        |     |       |              |    | Driller                               |         |
| Not<br>Elev |         | eference: Elevations were interpolated from a topographic site plan.   | ancement M<br>4 HSA      | 4ethod |     |       |              |    | W. Duggins<br>Logged by<br>Z. Marples |         |

Abandonment Method Boring backfilled with auger cuttings upon completion. Boring Started 12-06-2022 Boring Completed 12-06-2022



# Boring Log No. B-02

| L           | б           | Location: See Exploration Plan   |            |                           |             |                             | e                 | ц                     | (%)                  | Atterberg<br>Limits             |                  |
|-------------|-------------|--|------------|---------------------------|-------------|-----------------------------|-------------------|-----------------------|----------------------|---------------------------------|------------------|
| Model Layer | Graphic Log | Latitude: 35.7554° Longitude: -77.9012°  |            |                           | Depth (Ft.) | Water Level<br>Observations | Sample Type       | Field Test<br>Results | Water<br>Content (%) | LL-PL-PI                        | Percent<br>Fines |
| Moc         | Gra         |  |            |                           | Del         | Na<br>Obs                   | Sai               | E -                   | Co                   |                                 | <b>.</b> .       |
| -           | 1. 1. 1. 12 | Depth (Ft.)<br>0.5 <b>TOPSOIL</b> , 6 inches   | Elevation  | n: 116 (Ft.) +/-<br>115.5 |             |                             |                   |                       |                      | 4                               |                  |
| 194         |             | FAT CLAY (CH), gray to brown, stiff  |            | 11010                     |             |                             |                   |                       |                      |                                 | ***<br>1         |
|             |             |  |            |                           |             |                             | M                 | 3-5-6                 | 1.7                  |                                 |                  |
|             |             |  |            |                           | -           |                             | $\wedge$          | N=11                  |                      |                                 |                  |
| 2           |             |  |            |                           | _           |                             |                   |                       | 1                    |                                 |                  |
|             |             |  |            |                           |             |                             |                   |                       |                      |                                 | *                |
|             |             | and the second |            |                           | -           |                             | V                 | 6-5-7                 |                      |                                 | -                |
|             |             | 5.0  |            | 111                       | 5-          |                             | $\land$           | N=12                  | - 2                  |                                 |                  |
|             |             | SILTY SAND (SM), gray, very loose to loose   |            |                           |             |                             |                   |                       |                      |                                 | 1. A             |
|             |             |  |            |                           | -           | $\nabla$                    |                   | P.                    |                      |                                 | 5                |
|             |             |  |            |                           |             |                             | X                 | 3-4-3<br>N=7          | а<br>                |                                 |                  |
|             |             |  |            |                           |             |                             | $\langle \rangle$ |                       |                      |                                 |                  |
| 3           |             |  |            |                           | -           |                             |                   |                       |                      |                                 | . 6              |
|             |             |  |            |                           | _           |                             | $\backslash$      | 1-1-1                 | 1                    |                                 | s                |
|             |             |  |            |                           | , I.        |                             | X                 | N=2                   | 7.                   |                                 |                  |
|             |             |  |            |                           | 10-         |                             |                   |                       |                      |                                 |                  |
|             |             | 11.0   |            | 105                       | _           |                             |                   |                       |                      |                                 |                  |
|             |             | <u>SILT (ML)</u> , gray, soft  |            |                           |             |                             |                   |                       |                      |                                 |                  |
|             |             |  |            |                           | -           |                             |                   |                       |                      |                                 |                  |
| 4           |             |  |            |                           | _           |                             |                   |                       | à:                   |                                 |                  |
|             |             |  |            |                           |             |                             |                   |                       |                      |                                 |                  |
|             |             |  |            |                           | -           |                             | X                 | 2-2-2<br>N=4          |                      |                                 |                  |
|             |             | 15.0   |            | 101                       | 15-         | ,                           | $\langle \rangle$ |                       | 1                    |                                 |                  |
|             |             | Boring Terminated at 15 Feet   |            |                           |             |                             |                   |                       | 1 14                 |                                 |                  |
|             | 2           |  |            |                           |             |                             |                   |                       |                      |                                 | 13               |
|             |             |  |            |                           |             |                             |                   |                       |                      |                                 |                  |
|             |             |  |            |                           |             |                             |                   |                       |                      |                                 |                  |
|             | 0           |  |            |                           |             |                             |                   |                       |                      |                                 |                  |
|             |             |  |            |                           |             |                             |                   |                       | 9                    |                                 |                  |
|             |             |  |            |                           |             |                             |                   |                       |                      |                                 |                  |
|             |             | 2 C C C C C C C C C C C C C C C C C C C  |            |                           |             |                             |                   |                       |                      |                                 |                  |
|             |             |  |            |                           |             |                             |                   |                       |                      |                                 |                  |
| 8           |             |  |            |                           |             |                             |                   |                       | а<br>Б               |                                 |                  |
|             |             |  |            |                           |             |                             |                   |                       |                      |                                 | 1.               |
|             |             |  |            |                           |             |                             |                   |                       |                      |                                 | · .              |
|             | 1           |  |            |                           | × .         |                             |                   |                       |                      |                                 |                  |
|             |             |  |            |                           |             |                             |                   |                       | 1                    |                                 |                  |
| L           |             |  |            |                           |             |                             |                   |                       | Change Change        | Solore Contractory and a second | in the second    |
| See         | Explor      | ation and Testing Procedures for a description of field and la<br>used and additional data (If any).             | aboratory  | Water Level O             | bservat     | ions                        |                   |                       |                      | Drill Rig<br>Geoprobe 323       | ODT              |
|             |             | rting Information for explanation of symbols and abbreviation  | ons.       | At complet                | tion of dr  | illing                      |                   |                       |                      | Hammer Typ                      |                  |
|             |             |  |            | Chief State               |             |                             |                   |                       |                      | Automatic                       |                  |
|             | 1.5         |  |            | Advancement               | Mathod      |                             |                   |                       |                      | Driller<br>W. Duggins           |                  |
| Not         |             | Reference: Elevations were interpolated from a topographic   | site plan. | 2 1/4 HSA                 | Hernoa      |                             |                   |                       |                      | Logged by                       |                  |
|             |             |  |            |                           |             |                             |                   |                       |                      | Z. Marples                      |                  |
|             |             |  |            | Abandonment               | Method      |                             |                   |                       |                      | Boring Starte<br>12-05-2022     | 50               |
|             |             |  |            | Boring backfilled         | i with at   | iger ci                     | utting            | s upon completion.    |                      | Boring Comp<br>12-05-2022       | leted            |



|             | 1                                |  | 1               |             |                             |                   |                       | 1                    | A ++                        |                  |
|-------------|----------------------------------|--|-----------------|-------------|-----------------------------|-------------------|-----------------------|----------------------|-----------------------------|------------------|
| yer         | 60-                              | Location: See Exploration Plan   |                 |             | la si                       | be                | <i>ы</i>              | (%                   | Atterberg<br>Limits         | 1                |
| Model Layer | Graphic Log                      | Latitude: 35.7560° Longitude: -77.9009°  |                 | Depth (Ft.) | Water Level<br>Observations | Sample Type       | Field Test<br>Results | Water<br>Content (%) |                             | Percent<br>Fines |
| ode         | apt                              |  |                 | pth         | ater<br>serv                | Idm               | ield<br>Res           | Wa                   | LL-PL-PI                    | Fin              |
| Σ           | Ū                                |  |                 | De          | ≥q                          | S                 | ш                     | ပိ                   |                             |                  |
| -           | 1 h.                             | Depth (Ft.) Elevation: 118 (<br>TOPSOIL, 12 inches   | <u>Ft.) +/-</u> |             |                             |                   |                       |                      |                             |                  |
|             | <u>xt 1,</u><br>1, <u>x</u> t 1, | 1.0  | 117             |             |                             |                   |                       |                      | - iphila                    | 1                |
|             |                                  | CLAYEY SAND (SC), brown, medium dense  |                 |             |                             | $\mathbb{N}$      | 6-10-14               |                      |                             |                  |
| 2           |                                  |  |                 | -           |                             | Ŵ                 | N=24                  |                      |                             |                  |
|             |                                  | 3.0  | 115             |             |                             |                   | 1 K                   | 1                    |                             |                  |
|             |                                  | SANDY FAT CLAY (CH), brown, soft to medium stiff   |                 |             | $\mathbf{V}$                |                   |                       | 4                    |                             |                  |
|             |                                  |  |                 |             |                             | V                 | 2-2-3                 |                      |                             |                  |
|             |                                  |  |                 | 5 —         |                             | /                 | N=5                   |                      |                             |                  |
|             |                                  |  | í.              | 5           |                             |                   | 1.2.3                 |                      |                             | 1                |
|             |                                  |  |                 |             |                             |                   |                       | -                    |                             |                  |
| 4           |                                  |  |                 | _           |                             | X                 | 1-1-3<br>N=4          |                      |                             |                  |
|             |                                  |  |                 |             |                             | $\langle \rangle$ |                       |                      |                             |                  |
|             |                                  | • d *  |                 | -           |                             |                   |                       |                      | ÷                           | 2                |
|             |                                  |  |                 | _           |                             | $\backslash /$    | 1-1-1                 | 1                    |                             |                  |
|             |                                  | 10.0   | 100             |             | ę.                          | Х                 | N=2                   | P                    |                             |                  |
|             |                                  | Boring Terminated at 10 Feet   | 108             | 10-         |                             |                   |                       |                      |                             |                  |
|             |                                  |  |                 |             |                             |                   |                       |                      |                             |                  |
|             |                                  |  |                 |             |                             |                   |                       |                      | 5                           |                  |
|             |                                  |  |                 |             |                             |                   |                       |                      |                             |                  |
|             |                                  |  |                 |             |                             |                   |                       |                      |                             |                  |
|             | *                                |  |                 |             |                             |                   |                       |                      | 2                           |                  |
|             |                                  |  |                 |             |                             |                   |                       |                      | 1                           |                  |
|             |                                  |  |                 |             |                             |                   |                       |                      |                             |                  |
|             |                                  |  |                 |             |                             |                   |                       |                      |                             |                  |
|             |                                  |  |                 |             |                             |                   |                       |                      |                             |                  |
|             |                                  |  |                 |             |                             |                   |                       |                      |                             |                  |
|             |                                  |  |                 |             |                             |                   |                       |                      |                             | 7. <sup>11</sup> |
|             |                                  |  |                 |             | 2                           |                   |                       |                      |                             |                  |
|             | 1                                |  |                 | e           |                             |                   |                       | 3                    |                             |                  |
|             |                                  |  |                 |             |                             |                   |                       |                      |                             |                  |
|             |                                  |  |                 |             |                             |                   |                       |                      |                             |                  |
|             |                                  |  |                 | , ¥.,       | E)                          |                   |                       | 3                    |                             |                  |
|             |                                  |  |                 |             |                             |                   |                       |                      |                             | 2                |
|             |                                  |  | 9               |             |                             |                   |                       |                      |                             |                  |
|             |                                  |  |                 |             |                             |                   |                       |                      |                             |                  |
|             |                                  |  |                 | 8           |                             |                   |                       | 3                    |                             |                  |
|             |                                  |  |                 |             |                             |                   |                       |                      |                             |                  |
|             |                                  |  |                 |             |                             |                   |                       |                      |                             |                  |
| See         | Explora                          | ation and Testing Procedures for a description of field and laboratory Water<br>used and additional data (If any). | Level Ob        | servati     | ons                         |                   |                       |                      | Drill Rig                   | ODT              |
|             |                                  |  | At completi     | on of dri   | llina                       |                   |                       |                      | Geoprobe 323                |                  |
|             |                                  |  |                 |             |                             |                   |                       |                      | Hammer Typ<br>Automatic     | e                |
|             |                                  |  |                 |             |                             |                   |                       |                      | Driller<br>W. Duggins       |                  |
| Not         |                                  | eference: Elevations were interpolated from a topographic site plan.   | ICEMENT M       | lethod      |                             |                   |                       |                      | Logged by                   |                  |
|             |                                  | and the point of the point of the point of the point   |                 |             |                             |                   |                       |                      | Z. Marples                  |                  |
|             |                                  | Aband  | lonment N       | lethod      |                             |                   |                       |                      | Boring Starte<br>12-05-2022 | ed               |
|             |                                  | Boring   | backfilled      | with au     | ger cu                      | itting            | s upon completion.    |                      | Boring Comp                 | leted            |
|             |                                  |  |                 |             |                             |                   |                       |                      | 12-05-2022                  |                  |



|             |                           | Location: See Exploration Plan   | -               | _ 0                         | ø                 |                       | (•)                  | Atterberg<br>Limits        | •                |
|-------------|---------------------------|--|-----------------|-----------------------------|-------------------|-----------------------|----------------------|----------------------------|------------------|
| Model Layer | Graphic Log               | Latitude: 35.7564° Longitude: -77.9007°  | Depth (Ft.)     | Water Level<br>Observations | Sample Type       | Field Test<br>Results | Water<br>Content (%) | Linito                     | Percent<br>Fines |
| del L       | aphic                     | Latitude. 55.7504 Longitude. 77.5007   | epth            | ater                        | ample             | Field                 | Wa                   | LL-PL-PI                   | Perc             |
| Mo          |                           |  | ď               | ≥9                          | š                 |                       | Ŭ                    |                            |                  |
|             | <u>1. : x1 k</u>          | Depth (Ft.)         Elevation: 124 (Ft.) +/-           0.5         CULTIVATED SOIL, 6 inches         123.5 |                 |                             |                   |                       |                      |                            | -                |
|             |                           | SANDY FAT CLAY (CH), brown to gray, stiff  | , °             |                             |                   |                       |                      |                            |                  |
|             |                           |  |                 |                             | X                 | 3-5-6<br>N=11         |                      |                            |                  |
|             |                           |  | _               |                             | $\langle \rangle$ |                       |                      | 1.8                        | 6                |
| 2           |                           |  | -               |                             |                   |                       |                      |                            |                  |
|             |                           |  | _               |                             | $\mathbb{N}$      | 5-7-8                 | 3                    |                            |                  |
|             |                           | 5.0 119  | -               | $\nabla$                    | $\square$         | 5-7-8<br>N=15         |                      |                            |                  |
|             |                           | 5.0 CLAYEY SAND (SC), brown, very loose  | 5-              |                             |                   |                       |                      |                            | 1                |
|             | $\langle D \rangle$       |  | -               | -                           |                   |                       |                      |                            |                  |
|             | $\langle \rangle \rangle$ |  |                 |                             | X                 | 3-2-1<br>N=3          |                      |                            |                  |
| 4           | $\langle \rangle \rangle$ |  | - <sup>01</sup> |                             | ( )               |                       |                      |                            |                  |
|             |                           |  | -               | 1                           |                   |                       |                      |                            |                  |
|             |                           |  | -               | 1                           | V                 | 1-1-1<br>N=2          |                      |                            | 2<br>5 - 11      |
|             |                           | 10.0 114   | 10-             |                             | $\square$         | IN-2                  |                      |                            |                  |
|             |                           | Boring Terminated at 10 Feet   |                 |                             |                   |                       |                      |                            | 1                |
|             |                           |  |                 |                             |                   |                       |                      |                            |                  |
|             |                           |  |                 |                             |                   |                       |                      |                            |                  |
|             |                           |  |                 |                             |                   |                       |                      |                            |                  |
|             |                           |  |                 |                             |                   |                       |                      |                            | , d              |
|             |                           |  |                 |                             |                   |                       |                      |                            |                  |
|             |                           |  |                 |                             |                   |                       |                      |                            |                  |
|             |                           |  |                 |                             |                   |                       |                      |                            |                  |
|             |                           |  |                 |                             |                   |                       |                      | 0                          |                  |
|             |                           |  |                 |                             |                   |                       |                      |                            | -                |
|             |                           |  |                 |                             |                   |                       |                      |                            |                  |
|             |                           |  |                 |                             |                   |                       |                      |                            |                  |
|             |                           |  |                 |                             |                   |                       |                      |                            |                  |
|             |                           |  |                 |                             |                   |                       |                      |                            |                  |
|             |                           |  |                 |                             |                   |                       |                      |                            |                  |
|             |                           |  |                 |                             |                   |                       | -                    |                            |                  |
|             |                           |  |                 |                             |                   |                       |                      |                            | *                |
|             |                           |  |                 |                             |                   |                       |                      |                            |                  |
|             |                           |  |                 |                             |                   |                       |                      |                            |                  |
|             |                           |  |                 |                             |                   |                       |                      |                            |                  |
|             | E                         | ation and Testing Procedures for a description of field and laboratory Water Level C                       | bserva          | tions                       |                   | a Albah an D          | 1. S. S. S.          | Drill Rig                  |                  |
| pro         | cedure                    | s used and additional data (If any).   |                 |                             |                   |                       |                      | Geoprobe 323               |                  |
| See         | Suppo                     | rting Information for explanation of symbols and abbreviations.  | etion of d      | rilling                     |                   |                       |                      | Hammer Typ<br>Automatic    | e .              |
|             |                           |  |                 |                             |                   |                       |                      | Driller<br>W. Duggins      |                  |
| No          |                           | Reference: Elevations were interpolated from a topographic site plan.                                      | Method          |                             |                   |                       |                      | Logged by<br>Z. Marples    |                  |
| Ele         | vation                    | Reletence, Elevations were interpolated norm a topographic site plant                                      |                 |                             |                   |                       |                      |                            | od               |
|             |                           | Abandonment  | Metho           | d                           |                   | gs upon completion    |                      | Boring Start<br>12-05-2022 | ea               |
|             |                           | Boring backfille   | a with a        | ager (                      | acuni             | gs upon completion.   |                      | Boring Comp<br>12-05-2022  | leted            |
|             |                           |  |                 |                             |                   |                       |                      |                            |                  |



| -           | _                                  |  |            |                  |                             | -                 |   |                      |                           |                  |
|-------------|------------------------------------|--|------------|------------------|-----------------------------|-------------------|---|----------------------|---------------------------|------------------|
| 5           | D                                  | Location: See Exploration Plan   |            |                  |                             | υ                 |   |                      | Atterberg                 |                  |
| Model Layer | Graphic Log                        |  |            | Depth (Ft.)      | ons                         | Sample Type       | Field Test<br>Results                   | 1 %                  | Limits                    | L.               |
| 12          | hic                                | Latitude: 35.7570° Longitude: -77.9006°                                      |            | E)               | /ati                        | e                 | int 1                                   | nte                  |                           | Percent<br>Fines |
| de          | ap                                 |  |            | bt               | sen                         | đ                 | See                                     | N S                  | LL-PL-PI                  | Fir              |
| Σ           | ច                                  |  |            | De               | Water Level<br>Observations | Sa                | Ē —                                     | Water<br>Content (%) | CC-7C-71                  |                  |
|             |                                    | Depth (Ft.) Elevation: 128 (   | Ft.) +/-   |                  |                             |                   |   |                      |                           |                  |
|             | <u>x<sup>1</sup> 1<sub>1</sub></u> | CULTIVATED SOIL, 10 inches 0.8 EAT CLAY (CH) brown stiff                     |            |                  |                             |                   |   |                      |                           |                  |
| AN STR      | 111                                | 0.8<br>FAT CLAY (CH), brown, stiff   | 127.2      |                  | 5                           |                   |   |                      |                           | · ·              |
|             |                                    | FAT CLAT (CH), blown, sun  |            |                  |                             | N/                |   |                      |                           |                  |
|             |                                    |  |            |                  | 2556                        | X                 | 1-4-5<br>N=9                            | 26.0                 | 66-32-34                  | 90               |
|             |                                    |  |            |                  |                             | VΝ                | 11-5                                    |                      |                           |                  |
|             |                                    |  |            |                  |                             |                   |   |                      |                           | 1                |
|             |                                    |  |            |                  |                             |                   |   |                      |                           |                  |
|             |                                    |  |            | B.               | ÷.,                         | $\Lambda$         |   | 6-                   |                           |                  |
|             |                                    |  |            |                  |                             | IXI               | 3-4-7<br>N=11                           | 81                   |                           |                  |
|             |                                    | 5.0  | 123        | 5-               |                             | V N               | N-11                                    |                      |                           |                  |
| 2           |                                    | CLAYEY SAND (SC), brown, medium dense  |            | 5                |                             |                   | 14 - 14 - 14 - 14 - 14 - 14 - 14 - 14 - |                      |                           | 3                |
|             |                                    |  |            |                  |                             |                   | ŝv.                                     |                      |                           |                  |
|             |                                    |  |            |                  |                             | NΛ                | 2 5 6                                   |                      |                           |                  |
|             |                                    |  |            | _                | 3                           | IXI               | 2-5-6<br>N=11                           |                      |                           |                  |
|             |                                    |  |            | - <sup>8</sup> . |                             | $\vee$            |   |                      |                           |                  |
|             |                                    |  |            |                  |                             |                   |   |                      |                           |                  |
|             |                                    |  |            |                  |                             |                   | 2                                       |                      |                           |                  |
|             |                                    |  |            |                  |                             | $\Lambda/$        | 3-5-5                                   |                      |                           | 6 m              |
|             |                                    |  |            |                  |                             | IXI               | N = 10                                  |                      |                           |                  |
| 12          |                                    | 10.0   | 118        | 10               |                             | $\langle \rangle$ |   |                      |                           |                  |
|             |                                    | Boring Terminated at 10 Feet   |            | 10               |                             |                   |   |                      |                           |                  |
|             |                                    |  | -          |                  |                             |                   |   |                      |                           |                  |
|             |                                    |  |            | 0                |                             |                   |   |                      |                           |                  |
|             |                                    |  |            |                  |                             |                   |   |                      |                           | 8                |
|             |                                    |  |            |                  |                             |                   |   |                      |                           |                  |
|             |                                    |  |            |                  |                             |                   |   |                      |                           |                  |
|             |                                    |  |            |                  |                             |                   |   |                      |                           |                  |
|             |                                    |  | 5.         |                  |                             |                   |   |                      | 2.5                       |                  |
|             |                                    |  |            |                  |                             |                   |   |                      |                           | ar, I            |
|             | 8                                  |  |            |                  |                             |                   |   | 1                    |                           |                  |
|             | 2                                  |  |            |                  |                             |                   |   |                      |                           |                  |
|             | -                                  |  |            |                  |                             |                   |   | 5                    |                           |                  |
|             |                                    |  | ×          |                  |                             |                   |   |                      | -                         |                  |
|             |                                    |  |            |                  |                             |                   |   |                      |                           |                  |
|             |                                    |  |            |                  |                             |                   |   |                      |                           |                  |
|             |                                    |  |            | 1000             |                             |                   |   | -                    |                           |                  |
|             |                                    |  |            |                  |                             |                   |   |                      |                           |                  |
|             |                                    |  |            |                  |                             |                   |   |                      |                           |                  |
|             |                                    |  |            |                  |                             |                   |   |                      |                           |                  |
|             |                                    |  |            |                  |                             |                   |   |                      | . · · ·                   |                  |
|             |                                    |  |            |                  |                             |                   |   |                      |                           |                  |
|             | -                                  |  |            |                  |                             |                   |   |                      |                           |                  |
|             |                                    |  |            |                  |                             |                   |   |                      |                           |                  |
|             |                                    |  |            |                  |                             |                   |   |                      | , i                       | <u>k</u>         |
|             |                                    |  |            |                  |                             |                   |   |                      |                           |                  |
|             |                                    |  |            |                  |                             |                   |   |                      |                           |                  |
|             |                                    |  |            |                  | Ξ                           |                   |   |                      |                           |                  |
|             |                                    |  |            |                  |                             |                   |   |                      |                           |                  |
|             |                                    |  |            |                  |                             |                   |   |                      |                           |                  |
| See         | Explore                            | ation and Testing Procedures for a description of field and laboratory Water | Level Ob   | Servat:          | 0.05                        |                   |   | Constantia           |                           | Distant.         |
| proc        | edures                             |  | Groundwa   |                  |                             | ntere             | d                                       |                      | Drill Rig<br>Geoprobe 323 | ODT              |
| See         | Suppor                             | ting Information for explanation of symbols and abbreviations.               |            |                  |                             |                   |   |                      |                           |                  |
|             | 1214                               |  |            |                  |                             |                   |   |                      | Hammer Typ<br>Automatic   | e                |
|             |                                    |  |            |                  |                             |                   |   |                      | Driller                   |                  |
| Note        | es                                 |  | cement M   | Method           |                             |                   |   |                      | W. Duggins                |                  |
|             |                                    | eference: Elevations were interpolated from a topographic site plan. 2 1/4   | HSA        |                  |                             |                   |   |                      | Logged by                 |                  |
|             |                                    |  |            |                  |                             |                   |   |                      | Z. Marples                |                  |
|             |                                    |  |            |                  |                             |                   |   |                      | Boring Starte             | ed               |
|             |                                    | Abanc<br>Borina  | backfilled | with au          | aer cu                      | ittina            | s upon completion.                      |                      | 12-05-2022                |                  |
|             |                                    |  |            | Section 1        |                             |                   |   |                      | Boring Comp<br>12-05-2022 | leted            |
|             |                                    |  |            |                  |                             |                   |   |                      | 12-03-2022                |                  |



|             |                    | Location: See Exploration Plan   | Т        |             |                             | ω            |                           | 3                    | Atterberg<br>Limits       |                  |
|-------------|--------------------|--|----------|-------------|-----------------------------|--------------|---------------------------|----------------------|---------------------------|------------------|
| Model Layer | Graphic Log        |  |          | (Ft.)       | Water Level<br>Observations | Sample Type  | Field Test<br>Results     | Water<br>Content (%) | LITTICS                   | Percent<br>Fines |
| lel L       | phic               | Latitude: 35.7575° Longitude: -77.9011°  |          | Depth (Ft.) | ater L<br>serva             | mple         | ield <sup>-</sup><br>Resu | Wat                  | LL-PL-PI                  | Perc             |
| Mod         | Gra                |  |          | De          | SNO<br>SdO                  | Sa           | E -                       | Ő                    |                           | 5                |
|             | AL 1               | Depth (Ft.) Elevation: 128 (Ft.) -   |          |             |                             |              |                           |                      |                           |                  |
| 1250        | <u>74 1</u> × . 71 | 0.7 CULTIVATED SOIL, 8 inches 1  | .27.3    |             |                             |              |                           |                      |                           |                  |
|             |                    | SANDY FAT CLAY (CH), brown, stiff  |          |             |                             | M            | 4-5-6                     |                      |                           |                  |
|             |                    |  |          | -           |                             | $\wedge$     | N=11                      |                      |                           | :                |
|             |                    | 3.0  | 125      | _           |                             |              | . 1                       |                      |                           |                  |
|             | 11                 | CLAYEY SAND (SC), brown, medium dense  |          |             | в                           | $\backslash$ |                           |                      |                           |                  |
|             |                    |  |          |             |                             | Х            | 4-7-9<br>N=16             |                      |                           |                  |
|             |                    | 5.0<br><u>SANDY FAT CLAY (CH)</u> , brown to red, stiff  | 123      | 5 –         |                             |              |                           | 1                    |                           | -                |
| 2           |                    | Child I Frit Carte (Cr.), Brown to roop star   |          | _           |                             |              |                           | -                    |                           | 5                |
|             |                    |  |          |             |                             | $\mathbb{V}$ | 3-4-5                     |                      |                           |                  |
|             |                    |  |          | -           |                             | /            | N=9                       |                      |                           |                  |
|             |                    |  |          | -           | $\nabla$                    |              |                           |                      | 1. S. B.                  | 1                |
|             |                    |  |          | _           |                             | $\backslash$ | 3-3-7                     | 1                    |                           |                  |
|             |                    |  |          |             | 1                           | Å            | N=10                      |                      |                           |                  |
|             |                    |  |          | 10-         |                             |              |                           | 1                    |                           |                  |
|             |                    |  | 117      | _           |                             |              |                           |                      |                           | 2<br>3           |
|             |                    | SILTY SAND (SM), brown, very loose   |          | _           |                             |              |                           | 1                    |                           |                  |
|             |                    |  |          |             |                             |              |                           |                      |                           |                  |
| 3           |                    |  |          | <u> </u>    |                             |              |                           | · · ·                |                           |                  |
|             |                    |  |          | _           |                             | $\mathbb{N}$ | 1-1-1                     |                      | _                         |                  |
|             |                    | 15.0   | 113      | 15-         |                             | $\wedge$     | N=2                       |                      |                           |                  |
| -           |                    | Boring Terminated at 15 Feet   |          | 12-         |                             |              |                           | *                    |                           |                  |
|             |                    |  |          |             |                             |              |                           | 2                    |                           |                  |
|             |                    |  |          |             |                             |              |                           |                      |                           |                  |
|             |                    |  |          |             |                             |              |                           |                      |                           |                  |
|             | 2                  |  |          |             |                             |              |                           |                      |                           |                  |
|             |                    |  |          |             |                             |              | · · · ·                   |                      |                           | 3                |
|             |                    |  |          |             |                             |              |                           |                      |                           |                  |
|             |                    |  |          |             |                             |              |                           |                      |                           |                  |
|             |                    |  |          |             |                             |              |                           |                      |                           |                  |
|             | 2                  |  |          |             |                             | e.           |                           |                      |                           |                  |
|             |                    |  |          |             |                             |              | . 1                       |                      |                           |                  |
|             |                    |  |          |             | à.                          |              |                           |                      |                           |                  |
|             |                    |  |          |             |                             |              |                           |                      |                           |                  |
| L           |                    |  |          |             | L                           |              |                           |                      |                           | normaliz o       |
| Se          | e Explo            | ration and Testing Procedures for a description of field and laboratory Water Level and additional data (If any) | vel Obs  | servat      | ions                        |              |                           |                      | Drill Rig<br>Geoprobe 323 | BODT             |
| pro<br>Se   | e Suppo            | s used and additional data (If any).<br>orting Information for explanation of symbols and abbreviations.         | ompletio | on of dr    | illing                      |              |                           |                      | Hammer Typ                |                  |
|             |                    |  |          |             |                             |              |                           |                      | Automatic<br>Driller      |                  |
| Ne          | tes                | Advancen   |          | ethod       |                             |              |                           |                      | W. Duggins                |                  |
|             |                    | Reference: Elevations were interpolated from a topographic site plan. 2 1/4 HSA                                  |          |             |                             |              |                           |                      | Logged by<br>Z. Marples   |                  |
|             |                    |  |          |             |                             |              |                           |                      | Boring Start              | ed               |
|             |                    | Abandon<br>Boring bac  | ment M   | with au     | l<br>Jger c                 | uttin        | gs upon completion.       |                      | 12-05-2022                | leted            |
|             |                    |  |          |             |                             |              |                           |                      | Boring Comp<br>12-05-2022 | Jeren            |
|             |                    |  |          |             |                             |              |                           |                      |                           |                  |



# Boring Log No. B-07

| _           | 1                         |   |                       |                    |                             |                |                       |                       |                             |  |
|-------------|---------------------------|---|-----------------------|--------------------|-----------------------------|----------------|-----------------------|-----------------------|-----------------------------|--|
| er          | б                         | Location: See Exploration Plan  |                       |                    | _ o                         | ø              |                       |                       | Atterberg<br>Limits         |  |
| Model Layer | Graphic Log               | Latitude: 35.7575° Longitude: -77.9003°   |                       | Depth (Ft.)        | Water Level<br>Observations | Sample Type    | Field Test<br>Results | Water<br>Content (%)  | Linits                      | s H  |
| e I         | phi                       |   |                       | ÷                  | er L                        | ple            | L pl                  | /ate                  |                             | Percent<br>Fines   |
| lod         | gra                       |   |                       | ept                | Vate                        | am             | Re                    | ont                   | LL-PL-PI                    | Ре   |
| 2           |                           | Depth (Ft.) Elevation: 133 (  | E+ )   /              |                    | >0                          | S S            |                       | Ŭ                     |                             |  |
|             | <u>x1 14. X</u>           | CULTIVATED SOIL, 12 inches  | FL.) <del>+</del> /-  |                    |                             |                |                       |                       |                             |  |
|             | <u>x1/4</u> . x<br>1/ x1/ | 1.0   | 132                   |                    |                             |                |                       |                       |                             | 24   |
|             | 11                        | CLAYEY SAND (SC), brown, medium dense   |                       | _                  | 1                           | $\Lambda$      |                       |                       |                             |  |
|             |                           |   |                       |                    |                             | IXI            | 3-5-5<br>N=10         | 16.2                  | 38-19-19                    | 39   |
|             | 11                        | te a construction of the second se | 5 C                   |                    |                             | V              |                       |                       |                             |  |
|             |                           |   |                       | _                  | -                           |                |                       |                       |                             |  |
|             |                           |   |                       |                    |                             |                |                       | -                     |                             |  |
|             | 11                        |   |                       | -                  | i.                          | IVI            | 3-5-5                 |                       |                             |  |
|             |                           | 5.0   | 128                   |                    |                             | $  \wedge  $   | N=10                  | Ľ.,                   |                             |  |
|             | 111                       | FAT CLAY (CH), brown to red, stiff  | 120                   | 5 —                |                             |                |                       | 1                     |                             |  |
|             |                           |   |                       |                    |                             |                |                       |                       |                             |  |
|             |                           |   |                       | _                  | ]                           | $\Lambda$      | 246                   | 1                     |                             | 2  |
|             |                           |   |                       | 1 . A              | 12356                       | XI             | 3-4-6<br>N=10         |                       |                             |  |
|             |                           |   |                       |                    |                             | $/ \downarrow$ |                       | 1                     |                             |  |
| 2           |                           |   |                       | _                  |                             |                |                       |                       |                             |  |
|             |                           |   |                       |                    |                             |                |                       | -                     |                             | 1  |
|             |                           |   |                       | -                  |                             | V              | 5-5-7                 |                       |                             | 21   |
|             |                           |   |                       | 10                 | 8                           | $/ \setminus$  | N=12                  |                       |                             |  |
|             |                           |   |                       | 10—                |                             |                |                       |                       |                             |  |
|             |                           | 11.0  | 122                   | _                  |                             |                |                       |                       |                             |  |
|             |                           | CLAYEY SAND (SC), brown, medium dense   |                       |                    |                             |                |                       |                       |                             | 10 C   |
|             |                           |   |                       | -                  |                             |                |                       |                       |                             | 6  |
|             |                           |   |                       |                    |                             |                |                       |                       |                             |  |
|             |                           |   |                       |                    |                             |                |                       |                       |                             |  |
|             |                           |   |                       |                    |                             | $\backslash /$ | 0.5.6                 |                       | . 6 II                      | 6  |
|             |                           |   |                       |                    |                             | ХІ             | 3-5-6<br>N=11         |                       | 4                           |  |
|             | 111                       | 15.0<br>Boring Terminated at 15 Feet  | 118                   | 15-                |                             |                |                       |                       |                             | -  |
|             |                           | boring reminated at 15 reet   |                       |                    |                             |                |                       |                       |                             |  |
|             |                           |   |                       |                    |                             |                |                       | 17                    |                             |  |
|             |                           |   | 8                     |                    |                             |                |                       |                       |                             | 1  |
|             |                           |   |                       |                    |                             |                |                       |                       | 5. <sup>10</sup>            |  |
| 2           | k.                        |   |                       |                    | 3                           |                |                       |                       |                             | 2  |
| 5           |                           |   |                       |                    |                             |                |                       |                       |                             |  |
|             |                           |   |                       |                    |                             |                |                       |                       |                             |  |
|             |                           |   |                       |                    |                             |                |                       |                       |                             |  |
|             |                           |   |                       |                    |                             |                |                       |                       |                             |  |
| a.          |                           |   |                       |                    |                             |                |                       |                       |                             |  |
| ÷.          | -                         |   |                       |                    |                             |                |                       |                       |                             |  |
|             |                           |   |                       |                    |                             |                |                       |                       |                             |  |
|             |                           |   |                       |                    |                             |                |                       |                       |                             |  |
|             |                           |   |                       |                    |                             |                |                       |                       |                             |  |
| 2           |                           |   |                       |                    |                             |                |                       |                       |                             | 1  |
|             | -                         |   |                       | *                  |                             |                |                       |                       |                             |  |
|             |                           |   |                       |                    |                             |                |                       |                       |                             |  |
| 0000        | Sec. 11                   |   | and the second second | ti con a lan panna | the lactored                | and a second   |                       | and the second second | · ·                         | In the later of th |
| See         | Explora                   |   | Groundwa              |                    |                             | ntere          | d and a second second |                       | Drill Rig<br>Geoprobe 323   | ODT  |
|             |                           | ting Information for explanation of symbols and abbreviations.  |                       |                    | licou                       |                |                       |                       |                             |  |
|             |                           |   |                       |                    |                             |                |                       |                       | Hammer Typ<br>Automatic     | e  |
|             |                           |   |                       |                    |                             |                |                       |                       | Driller                     |  |
| Not         | es                        |   | cement M              | lethod             |                             |                |                       |                       | W. Duggins                  |  |
| Elev        | ation R                   | eference: Elevations were interpolated from a topographic site plan.  | пза                   |                    |                             |                |                       |                       | Logged by<br>Z. Marples     |  |
|             |                           |   |                       |                    |                             |                |                       |                       |                             | Sec. 1   |
|             |                           | Aband   | lonment I             | Method             |                             |                |                       |                       | Boring Starte<br>12-05-2022 | ea   |
|             |                           | Boring  | backfilled            | with au            | ger cu                      | itting         | s upon completion.    |                       |                             |  |

Boring Completed 12-05-2022



|             |             | Location: See Explora                                  | tion Plan                         |                    |               |                                 |                    |                             |              |                          |                      | Atterberg   |                  |
|-------------|-------------|--|-----------------------------------|--------------------|---------------|---------------------------------|--------------------|-----------------------------|--------------|--------------------------|----------------------|---|------------------|
| Model Layer | Graphic Log |  |                                   |                    |               |                                 | Depth (Ft.)        | Water Level<br>Observations | Sample Type  | Field Test<br>Results    | Water<br>Content (%) | Limits  | Percent<br>Fines |
| el          | ohic        | Latitude: 35.7573° Lon                                 | igitude: -77.901                  | 160                |               |                                 | oth (              | ter L                       | nple         | eld <sup>-</sup><br>česu | Wat                  | LL-PL-PI  | Fine             |
| Mod         | Graj        |  |                                   |                    |               |                                 | Dep                | Wa                          | Sar          | Ē                        | Co                   |   |                  |
|             |             | Depth (Ft.)  |                                   |                    | Eleva         | tion: 125 (Ft.) +/-             |                    |                             |              |                          |                      |   |                  |
|             | <u>14</u>   | 0.4 CULTIVATED SC<br>SANDY FAT CLA                     | <b>DIL</b> , 5 inches             | n to gray soft     | to stiff      | 124.6                           |                    |                             |              |                          |                      |   | 5                |
|             |             | SANDT PAT CLA  | <u>((())</u> , biowi              | rto gray, sort     |               |                                 | -                  |                             | $\backslash$ | 1-2-2                    |                      |   |                  |
|             |             |  |                                   |                    |               |                                 | -                  | -                           | X            | N=4                      | -                    |   |                  |
|             |             |  |                                   |                    |               |                                 |                    |                             | ( )          |                          | 1                    |   | - *              |
|             |             |  |                                   |                    |               |                                 | -                  | 1                           |              |                          | 4                    | *   | э.,              |
|             |             |  |                                   |                    |               |                                 | -                  | 12354A                      | $\mathbb{N}$ | 4-4-4                    |                      |   |                  |
|             |             |  |                                   |                    |               |                                 | 5-                 | 16253451                    | $\mathbb{V}$ | N=8                      | 1                    |   |                  |
| 2           |             | a <sup>n</sup> , 6                                     |                                   |                    |               |                                 | 5                  |                             |              |                          |                      |   | 4                |
|             |             |  |                                   |                    |               |                                 | -                  |                             | /            |                          | 1                    |   | <u>P</u>         |
|             |             |  |                                   |                    |               |                                 | _                  |                             | X            | 2-3-5<br>N=8             |                      |   |                  |
|             |             |  |                                   |                    |               |                                 |                    |                             | ( )          |                          | -                    |   |                  |
|             |             |  |                                   |                    |               |                                 | -                  | 1                           |              |                          |                      |   |                  |
|             |             |  |                                   |                    |               |                                 | -                  | -                           | $\mathbb{N}$ | 2-4-6                    |                      |   | 2                |
|             |             | 10.0   |                                   |                    |               | 115                             | 10                 |                             | $\wedge$     | N=10                     | -                    |   |                  |
|             |             | Boring Termina   | ted at 10 Fee                     | et                 |               |                                 | 10-                |                             |              |                          |                      |   |                  |
|             |             | , 2. – B.  |                                   |                    |               |                                 |                    |                             |              |                          |                      | 1 - <sup>2</sup> - <sup>2</sup> - <sup>2</sup> - <sup>2</sup> | e * 1            |
|             |             |  |                                   |                    |               |                                 |                    |                             |              |                          |                      |   | Бж.              |
| 3           |             |  |                                   |                    |               |                                 |                    |                             |              |                          | · .                  |   |                  |
|             | P.,         |  |                                   |                    |               |                                 |                    |                             |              |                          |                      |   |                  |
|             |             |  |                                   |                    |               |                                 |                    |                             |              |                          |                      | 1<br>   | . 1              |
|             |             |  |                                   |                    |               |                                 |                    |                             |              | 2                        |                      |   | 5                |
|             | 1           |  |                                   |                    |               |                                 |                    | 1                           |              | ÷                        |                      |   |                  |
| - ä-        |             |  |                                   |                    |               |                                 |                    |                             |              |                          |                      |   |                  |
|             |             |  |                                   |                    |               |                                 |                    |                             |              | •                        |                      |   |                  |
|             |             |  |                                   |                    |               |                                 |                    |                             |              | - 12<br>                 |                      |   |                  |
| 1           | ā.          |  |                                   |                    |               |                                 |                    |                             |              |                          | -                    |   |                  |
|             |             |  |                                   |                    |               |                                 |                    |                             |              |                          |                      |   |                  |
|             |             |  |                                   |                    |               |                                 |                    |                             |              |                          |                      | :   |                  |
|             |             |  |                                   |                    |               |                                 |                    |                             |              |                          |                      |   | 2                |
|             |             |  |                                   |                    |               |                                 |                    |                             |              |                          |                      |   |                  |
| 1           |             |  |                                   |                    |               |                                 |                    |                             |              |                          |                      |   |                  |
|             |             |  |                                   |                    |               |                                 |                    |                             |              |                          |                      |   | 11               |
|             |             |  |                                   |                    |               |                                 |                    |                             |              |                          |                      |   |                  |
| 5           |             |  |                                   |                    |               |                                 | Ш.,                |                             |              |                          |                      |   |                  |
| 1           |             |  |                                   |                    |               |                                 | - <sup>57</sup>    |                             |              |                          |                      |   |                  |
| L           |             |  |                                   |                    |               |                                 |                    |                             |              |                          | ana taka             |   | in the second    |
| See         | Explor      | ation and Testing Proced<br>s used and additional data | ures for a descrip<br>a (If any). | ption of field and | laboratory    | Water Level O<br>Groundw        |                    |                             | Inter        | ed                       |                      | Drill Rig<br>Geoprobe 323                                     | ODT              |
| See         | Suppo       | orting Information for exp                             | lanation of symb                  | ools and abbrevia  | ations.       |                                 |                    |                             |              |                          |                      | Hammer Typ<br>Automatic                                       | e                |
|             |             |  |                                   |                    |               | 1253                            |                    |                             |              |                          |                      | Driller   |                  |
| No          | tes         |  |                                   |                    |               | Advancement                     | Method             | l<br>I                      |              |                          |                      | W. Duggins  |                  |
|             |             | Reference: Elevations we                               | re interpolated fi                | rom a topograph    | ic site plan. | 2 1/4 HSA                       |                    |                             |              |                          |                      | Logged by<br>Z. Marples                                       |                  |
|             |             |  |                                   |                    |               |                                 |                    |                             |              |                          |                      | Boring Start  | ed               |
|             |             |  |                                   |                    |               | Abandonment<br>Boring backfille | Method<br>d with a | d<br>uger o                 | uttin        | gs upon completion       |                      | 12-06-2022  |                  |
|             |             |  |                                   |                    |               |                                 |                    |                             |              |                          |                      | Boring Comp<br>12-06-2022                                     | pieted           |



# Boring Log No. B-09

| -           | T                         |   |                   |                         |                             |              |                       |                      |                                   |                  |
|-------------|---------------------------|---|-------------------|-------------------------|-----------------------------|--------------|-----------------------|----------------------|-----------------------------------|------------------|
| /er         | bo:                       | Location: See Exploration Plan  |                   | $\overline{\mathbf{C}}$ | la s                        | е            | ti                    | (%)                  | Atterberg<br>Limits               |                  |
| Model Layer | Graphic Log               | Latitude: 35.7571° Longitude: -77.9014°   |                   | Depth (Ft.)             | Water Level<br>Observations | Sample Type  | Field Test<br>Results | Water<br>Content (%) |                                   | Percent<br>Fines |
| bdel        | hde                       |   |                   | pth                     | serva                       | hple         | Resi                  | Wai                  | LL-PL-PI                          | Fin              |
| Ĕ           | ں<br>آ                    |   | E                 | De                      | ÅŐ                          | Sa           | Ш.                    | C                    |                                   | -                |
|             | 1 14. S                   | Depth (Ft.) Elevati CULTIVATED SOIL, 12 inches  | on: 123 (Ft.) +/- |                         |                             |              |                       |                      |                                   |                  |
|             | <u>x17</u> , x<br>17, x17 | 1.0   | 122               |                         |                             |              |                       |                      |                                   |                  |
|             |                           | SILTY SAND (SM), gray, loose  |                   |                         |                             | $\backslash$ | 1-2-2                 |                      |                                   |                  |
|             |                           |   |                   | _                       |                             | ΧI           | N=4                   |                      |                                   |                  |
| 3           |                           |   |                   |                         | ľ                           |              |                       |                      |                                   |                  |
| •           |                           |   |                   | -                       |                             |              |                       |                      |                                   | 1                |
|             |                           |   |                   | -                       | ſ                           | $\bigvee$    | 1-2-2                 | 3                    |                                   |                  |
|             |                           | 5.0   | 118               | -<br>-                  |                             | $\wedge$     | N=4                   | 1                    |                                   |                  |
|             |                           | SANDY FAT CLAY (CH), brown to gray, medium stiff  | 110               | 5 –                     | ľ                           |              | 4                     |                      |                                   |                  |
|             |                           |   |                   | _                       |                             |              |                       |                      |                                   |                  |
| 2           |                           |   |                   |                         | $\nabla$                    | $\vee$       | 3-3-5                 | . I                  |                                   |                  |
|             |                           |   |                   |                         |                             | $^{/}$       | N=8                   | 2                    |                                   |                  |
|             |                           | 8.0<br>SANDY FAT CLAY (CH), brown to gray, soft   | 115               | _                       |                             |              |                       |                      |                                   | -                |
| 4           |                           | SANDY FAT CLAY (CH), brown to gray, sort  |                   |                         |                             |              |                       |                      |                                   | 1                |
| 4           |                           |   |                   | -                       |                             | XI           | 2-1-1<br>N=2          | 5                    |                                   |                  |
|             |                           | 10.0<br>Boring Terminated at 10 Feet  | 113               | 10-                     | /                           | $^{\prime}$  |                       |                      |                                   |                  |
|             | 2                         | boring reminated at 10 reet   |                   |                         |                             |              |                       | 1                    |                                   |                  |
|             |                           |   |                   |                         |                             |              |                       |                      |                                   |                  |
|             |                           |   |                   |                         |                             |              |                       |                      |                                   |                  |
|             |                           |   |                   |                         | 8                           |              |                       |                      |                                   |                  |
|             |                           |   |                   | * 1                     |                             |              |                       |                      |                                   |                  |
|             |                           |   |                   |                         |                             |              |                       |                      |                                   |                  |
|             |                           |   |                   |                         |                             |              |                       |                      | 2                                 |                  |
|             | ~                         |   |                   | 2                       |                             |              |                       |                      |                                   |                  |
|             |                           |   |                   |                         |                             |              |                       |                      |                                   |                  |
|             |                           |   |                   |                         |                             |              |                       |                      | - E                               |                  |
|             |                           |   |                   |                         |                             |              |                       |                      |                                   |                  |
| -           |                           |   |                   |                         | 81                          |              |                       |                      |                                   |                  |
|             |                           |   |                   |                         |                             |              |                       |                      |                                   |                  |
|             |                           |   |                   |                         |                             |              |                       |                      |                                   | 1                |
|             |                           |   |                   |                         |                             |              |                       |                      |                                   |                  |
|             |                           |   |                   |                         |                             |              |                       |                      |                                   |                  |
|             |                           |   |                   |                         |                             |              |                       |                      |                                   |                  |
|             | 0                         |   |                   | 12                      |                             |              |                       |                      |                                   |                  |
|             |                           |   |                   |                         |                             |              |                       |                      |                                   |                  |
|             |                           |   |                   |                         |                             |              |                       |                      |                                   | e i              |
| - C         |                           |   |                   | 1                       |                             |              |                       |                      | 8                                 |                  |
|             |                           |   |                   |                         |                             |              |                       |                      |                                   |                  |
| Selent      | 21.21                     |   |                   |                         |                             | te training  |                       | Contraction of the   | And the party state of the second | Ratherstein Tra  |
| See         | edures                    | ation and Testing Procedures for a description of field and laboratory used and additional data (If any). | Water Level Obs   |                         | ons                         |              |                       |                      | Drill Rig<br>Geoprobe 323         | ODT              |
| See         | Suppor                    | ting Information for explanation of symbols and abbreviations.  | a market by       |                         |                             |              |                       |                      | Hammer Typ                        |                  |
|             |                           |   |                   |                         |                             |              |                       |                      | Automatic                         |                  |
| Not         | es                        |   | Advancement M     | ethod                   |                             |              |                       |                      | Driller<br>W. Duggins             |                  |
|             |                           | eference: Elevations were interpolated from a topographic site plan.                                      | 2 1/4 HSA         | Stilled                 |                             |              |                       |                      | Logged by                         |                  |
|             |                           |   |                   |                         |                             |              |                       |                      | Z. Marples                        |                  |
|             |                           |   | Abandonment M     |                         |                             |              |                       |                      | Boring Starte<br>12-05-2022       | ed               |
|             |                           |   |                   |                         | ger cut                     | ting         | s upon completion.    |                      | Boring Comp                       | lated            |

Boring Completed 12-05-2022



# Boring Log No. B-10

| L.          | 0                               | Location: See Exploration Plan   |             | - 0                         | e            | ч                     | (%)                  | Atterberg<br>Limits        |                  |
|-------------|---------------------------------|--|-------------|-----------------------------|--------------|-----------------------|----------------------|----------------------------|------------------|
| Model Layer | Graphic Log                     | Latitude: 35.7572° Longitude: -77.9000°  | Depth (Ft.) | Water Level<br>Observations | Sample Type  | Field Test<br>Results | Water<br>Content (%) |                            | Percent<br>Fines |
| odel        | raph                            |  | Depth       | Nater<br>bsen               | Samp         | Field                 | Conte                | LL-PL-PI                   | Pel              |
| Σ           |                                 | Depth (Ft.) Elevation: 132 (Ft.) +/-   |             | -0                          |              |                       |                      |                            | -                |
|             | <u>x 1.</u> <u>x</u><br>1, x 1, | CULTIVATED SOIL, 11 inches 131.:   | L           |                             |              | 2                     |                      |                            | 1                |
|             |                                 | CLAYEY SAND (SC), brown to red, loose  | -           |                             | $\bigvee$    | 5-3-3                 |                      |                            |                  |
|             | $\square$                       |  | -           |                             | $\wedge$     | N=6                   | _                    | 8                          |                  |
|             |                                 | 3.0 129<br>SANDY FAT CLAY (CH), brown to red, medium stiff to stiff                          | - 19        | -                           |              |                       |                      | 1.12                       |                  |
|             |                                 |  | -           | NES CA                      | $\mathbb{N}$ | 3-2-4                 | ř.                   |                            |                  |
|             |                                 |  | 5-          | - INCORAGE                  | $\Lambda$    | N=6                   |                      |                            |                  |
| 2           |                                 |  | _           |                             |              |                       |                      |                            |                  |
|             |                                 |  |             | 7                           | $\mathbb{N}$ | 2-5-6<br>N=11         |                      |                            | ×                |
|             |                                 |  |             | 1                           | $\wedge$     | N-11                  | -                    |                            |                  |
|             |                                 |  | -           | 1                           |              |                       |                      |                            |                  |
|             |                                 |  | -           | -                           | $\mathbb{N}$ | 3-4-5<br>N=9          |                      |                            | 2                |
|             |                                 | 10.0 12:<br>Boring Terminated at 10 Feet   | 2 10-       | -                           | $\wedge$     |                       | -                    |                            |                  |
|             | *                               | Boring Terminateu al 10 Feel   |             |                             |              | e.'                   |                      | 1                          |                  |
|             |                                 |  |             |                             |              |                       |                      |                            |                  |
|             |                                 |  | 51          |                             |              |                       | 1<br>. * e           |                            |                  |
| 13          |                                 |  | -           |                             |              |                       |                      |                            |                  |
|             |                                 |  |             |                             |              |                       |                      |                            |                  |
| ÷           |                                 |  |             |                             |              |                       |                      |                            |                  |
| 1           |                                 |  |             |                             |              |                       |                      |                            |                  |
|             |                                 |  |             |                             |              |                       |                      |                            |                  |
|             |                                 |  |             |                             |              | 22                    |                      |                            |                  |
| ст.<br>(Ф)  |                                 |  |             |                             |              |                       |                      |                            |                  |
|             |                                 |  |             |                             |              |                       |                      |                            |                  |
|             |                                 |  |             |                             |              | . 14                  |                      |                            | •                |
|             | 1                               |  |             |                             |              |                       |                      |                            |                  |
|             |                                 |  |             | •                           |              | ×                     | ŝ                    | 1                          | E.               |
|             |                                 |  |             |                             |              |                       |                      |                            |                  |
|             | i.                              |  |             |                             |              |                       | 8                    |                            |                  |
|             |                                 |  |             |                             |              |                       |                      |                            |                  |
| L           | Evolo                           | ation and Testing Procedures for a description of field and laboratory Water Level of Cround |             |                             | ic at        | A transmission        | (March               | Drill Rig                  | anes.            |
| pro         | cedure                          | rting Information for explanation of symbols and abbreviations.                              | vater nol   | encou                       | unter        | ed                    |                      | Geoprobe 323               |                  |
| See         | Suppo                           |  |             |                             |              |                       |                      | Automatic                  |                  |
| No          | tes                             | Advancement  | Method      | ł                           |              |                       |                      | Driller<br>W. Duggins      |                  |
|             |                                 | Reference: Elevations were interpolated from a topographic site plan. 2 1/4 HSA              |             |                             |              |                       |                      | Logged by<br>Z. Marples    |                  |
|             |                                 | Abandonmen   | t Metho     | d                           |              |                       |                      | Boring Start<br>12-05-2022 | ed               |
|             |                                 | Boring backfille   | ed with a   | uger o                      | uttin        | gs upon completion    |                      | Boring Comp<br>12-05-2022  | pleted           |



|             |                      | Location: See Exploration Plan  |                 | T                 | <b></b>                     |               |                       |                      | Atterberg                   | 1                |
|-------------|----------------------|---|-----------------|-------------------|-----------------------------|---------------|-----------------------|----------------------|-----------------------------|------------------|
| Model Layer | Graphic Log          |   |                 | £.                | Water Level<br>Observations | Sample Type   | s ist                 | Water<br>Content (%) | Limits                      | 4                |
| La<br>L     | nic                  | Latitude: 35.7572° Longitude: -77.8993°                               |                 | Depth (Ft.)       | /atic                       | le T          | Field Test<br>Results | nt (                 |                             | Percent<br>Fines |
| ode         | apl                  |   |                 | pth               | ater                        | du            | ield<br>Reg           | N V i                | LL-PL-PI                    | Fir              |
| Σ           | Ū                    |   |                 | Ď                 | Ş₿                          | Sa            | LL.                   | S                    |                             |                  |
|             |                      | Depth (Ft.) Elevation:<br>0.6 TOPSOIL, 7 inches                       | : 131 (Ft.) +/- |                   |                             |               |                       |                      |                             |                  |
| 1000        | <u>41</u> , <u>1</u> |   | 130.4           |                   |                             |               |                       |                      |                             | 1                |
|             | $\mathbb{Z}$         | CLAYEY SAND (SC), gray to brown, loose                                |                 | -                 |                             |               |                       |                      |                             |                  |
|             |                      |   |                 | а <sup>11</sup> , |                             | X             | 5-5-4<br>N=9          | ×"                   |                             |                  |
|             |                      | 2.5   | 128.5           |                   | 1                           | $/ \setminus$ | N=9                   |                      | 1.44                        |                  |
|             |                      | SANDY FAT CLAY (CH), brown to red, medium stiff to stiff              |                 | _                 | 12356                       |               |                       |                      |                             |                  |
|             |                      |   |                 | 8                 |                             |               |                       |                      |                             |                  |
|             |                      |   |                 | -                 |                             | W             | 3-3-5                 |                      |                             |                  |
|             |                      |   |                 | 5-                |                             | $/ \setminus$ | N=8                   |                      |                             |                  |
| 2           |                      |   |                 | 5-                |                             |               |                       | 1                    |                             |                  |
|             |                      |   |                 | _                 |                             |               |                       |                      |                             |                  |
|             |                      |   |                 |                   |                             | V             | 2-5-6                 |                      |                             | 3                |
|             |                      |   |                 |                   | а<br>1                      |               | N=11                  |                      | * <i>1</i>                  |                  |
|             |                      |   |                 |                   |                             |               |                       |                      |                             |                  |
|             |                      |   |                 |                   |                             |               |                       |                      |                             | 2                |
|             |                      |   |                 |                   |                             | $\mathbb{N}$  | 4-5-6                 |                      |                             | 5                |
|             |                      | 10.0  | 121             |                   |                             |               | N=11                  | с.                   |                             |                  |
|             |                      | Boring Terminated at 10 Feet  | 121             | 10-               |                             |               |                       |                      |                             |                  |
|             |                      |   |                 |                   |                             |               |                       |                      |                             | E.               |
|             |                      |   |                 |                   |                             |               |                       |                      |                             |                  |
|             |                      |   |                 |                   |                             |               |                       |                      |                             |                  |
|             |                      |   |                 |                   |                             |               |                       |                      |                             |                  |
|             |                      |   |                 |                   |                             |               |                       | · · · ·              |                             |                  |
|             |                      |   |                 |                   |                             |               |                       |                      |                             | 12               |
|             |                      |   |                 |                   |                             |               |                       |                      |                             |                  |
| 2           |                      |   |                 |                   |                             |               |                       |                      |                             |                  |
|             |                      |   |                 |                   |                             |               |                       |                      |                             |                  |
|             | -                    |   |                 |                   |                             |               |                       |                      |                             |                  |
|             |                      |   |                 |                   |                             |               |                       |                      |                             |                  |
|             |                      |   | 5               |                   |                             |               |                       |                      |                             |                  |
|             |                      |   |                 |                   | 5                           |               |                       |                      |                             |                  |
|             |                      |   |                 |                   |                             |               |                       |                      |                             |                  |
|             |                      |   |                 |                   |                             |               |                       |                      |                             |                  |
|             |                      |   |                 |                   |                             |               |                       |                      |                             |                  |
|             |                      |   |                 |                   |                             |               |                       |                      |                             |                  |
|             |                      |   |                 |                   |                             |               |                       |                      | 1404                        |                  |
|             |                      |   |                 |                   |                             |               |                       |                      |                             |                  |
|             |                      |   |                 |                   |                             |               |                       |                      | 8                           | 8                |
|             |                      |   |                 |                   |                             |               |                       |                      |                             |                  |
|             |                      |   |                 | 2                 |                             |               |                       | -                    |                             |                  |
|             |                      |   |                 |                   |                             |               |                       |                      | 2 h.                        |                  |
|             |                      |   |                 |                   |                             |               |                       |                      |                             |                  |
| See         | Explora              | tion and Testing Procedures for a description of field and laboratory | Water Level Of  | bservati          | ions                        |               |                       |                      | Drill Rig                   |                  |
| proc        | edures               | used and additional data (If any).                                    | Groundwa        | ater not          | encou                       | ntere         | d                     |                      | Geoprobe 323                | ODT              |
| See         | Suppor               | ting Information for explanation of symbols and abbreviations.        |                 |                   |                             |               |                       |                      | Hammer Type<br>Automatic    | e                |
|             |                      |   | 1236            |                   |                             |               |                       |                      |                             |                  |
| Note        | s                    |   | Advancement I   | Method            |                             |               |                       |                      | Driller<br>W. Duggins       |                  |
|             |                      |   | 2 1/4 HSA       |                   |                             |               |                       |                      | Logged by                   |                  |
|             |                      |   |                 |                   |                             |               |                       |                      | Z. Marples                  |                  |
|             |                      |   | Abandonment     |                   |                             |               |                       |                      | Boring Starte<br>12-05-2022 | ed               |
|             |                      |   |                 |                   |                             | utting        | s upon completion.    |                      | Boring Comp                 |                  |
|             |                      |   |                 |                   |                             |               |                       |                      | 12-05-2022                  |                  |
|             |                      |   |                 |                   |                             |               |                       |                      |                             |                  |



## Boring Log No. B-12

| L           | G             | Location: See Exploration Plan   |  | ~  | 0                           | e                       | ч                     | (9)                  | Atterberg<br>Limits        |                  |
|-------------|---------------|--|--|--|-----------------------------|-------------------------|-----------------------|----------------------|----------------------------|------------------|
| Model Layer | Graphic Log   | Latitude: 35.7567° Longitude: -77.9000°  |  | Depth (Ft.)  | Water Level<br>Observations | Sample Type             | Field Test<br>Results | Water<br>Content (%) |                            | Percent<br>Fines |
| I lab       | aphi          |  |  | epth   | later<br>bserv              | amply                   | Field<br>Res          | Wa                   | LL-PL-PI                   | Per              |
| β           | ß             |  | Elevation: 130 (Ft.) +/-   | õ  | ≥₽                          | ů                       |                       | Ŭ                    |                            |                  |
|             | <u>x1 / 1</u> | Depth (Ft.)<br>0.5 <b>CULTIVATED SOIL</b> , 6 inches   | 129.5  |  |                             |                         |                       |                      | 14.2                       |                  |
|             |               | SANDY FAT CLAY (CH), brown to red, stiff   | 1  | ÷  | •                           |                         |                       |                      |                            |                  |
|             |               |  |  |  |                             | Х                       | 3-5-7<br>N=12         |                      |                            |                  |
|             |               |  |  |  | 10922/0                     | $\langle \cdot \rangle$ |                       | -                    |                            |                  |
|             |               |  |  | -  | 1256                        |                         |                       |                      |                            |                  |
|             |               |  |  | 1 -  |                             | $\mathbb{N}$            | 5-5-8<br>N=13         |                      |                            |                  |
|             |               | 5.0  | 125  | 5 –  |                             | $\wedge$                | N=13                  | 2                    |                            |                  |
| 2           |               | <u>CLAYEY SAND (SC)</u> , brown to red, medium dense   |  | 5-   |                             |                         |                       |                      |                            |                  |
|             |               |  | - Li<br>   | -  | -                           |                         | 267                   | -                    |                            |                  |
|             |               |  |  | _  |                             | X                       | 3-6-7<br>N=13         |                      |                            |                  |
|             |               |  |  |  |                             |                         |                       |                      |                            |                  |
|             |               |  |  | _  |                             |                         |                       |                      |                            |                  |
|             |               |  |  | -  |                             | V                       | 4-5-7<br>N=12         |                      |                            |                  |
|             |               | 10.0   | 120  | 10-  |                             | $\square$               | N=12                  |                      |                            |                  |
|             |               | Boring Terminated at 10 Feet   |  |  |                             |                         |                       |                      |                            |                  |
|             |               |  |  |  |                             |                         |                       |                      |                            |                  |
|             |               |  |  |  |                             |                         |                       |                      |                            | * -              |
|             |               |  |  |  |                             |                         |                       |                      |                            |                  |
|             | 2             |  |  | 1  |                             |                         |                       |                      |                            |                  |
|             |               |  |  |  |                             |                         |                       |                      |                            |                  |
|             |               |  |  |  | 4                           |                         |                       |                      |                            |                  |
|             |               |  |  | 1  |                             |                         |                       |                      |                            |                  |
|             |               |  |  |  |                             |                         |                       | - 11                 |                            |                  |
|             |               |  |  |  |                             |                         |                       |                      |                            |                  |
|             | a             |  |  |  | 1                           |                         |                       | 2                    |                            |                  |
|             |               |  |  |  |                             |                         |                       |                      |                            |                  |
|             |               |  |  |  |                             |                         | -                     |                      |                            | 11               |
|             |               |  |  |  |                             |                         |                       |                      |                            |                  |
|             | - 16          |  |  | . *  | ž                           |                         |                       |                      |                            |                  |
| 1           |               |  |  |  |                             |                         |                       |                      |                            |                  |
|             |               |  |  |  |                             |                         |                       |                      |                            |                  |
|             |               |  |  |  |                             |                         |                       |                      |                            |                  |
|             | - R           |  |  |  | •                           |                         |                       |                      |                            |                  |
|             | 1             |  |  |  |                             |                         |                       |                      |                            |                  |
| 130075      | Par ang       |  | Water Level O  | hservat  | ions                        |                         |                       | a ar                 | Drill Rig                  | ked s            |
| pro         | cedure        | ration and Testing Procedures for a description of field and laborat<br>s used and additional data (If any). | Groundwa   |  |                             | intere                  | ed                    |                      | Geoprobe 323               | BODT             |
| See         | Suppo         | orting Information for explanation of symbols and abbreviations.   |  |  |                             |                         |                       |                      | Hammer Typ<br>Automatic    | be               |
|             |               |  | 1933 - Carlos - Carlo |  |                             |                         |                       |                      | Driller<br>W. Duggins      |                  |
|             | tes           |  | Advancement<br>2 1/4 HSA   | Method   |                             |                         |                       |                      | W. Duggins                 |                  |
| Ele         | vation        | Reference: Elevations were interpolated from a topographic site pl   | dii.   |  |                             |                         |                       |                      | Z. Marples                 |                  |
|             |               |  | Abandonment  | Method   | 1                           |                         |                       |                      | Boring Start<br>12-05-2022 | ed               |
|             |               |  | Boring backfilled  | Boring backfilled with auger cuttings upon completion. |                             |                         |                       |                      | Boring Comp<br>12-05-2022  | oleted           |



| -  | 1           |  |                           |           |                            |             |                             |                   |                       | 1 1                  | Athent   |                  |
|--|-------------|--|---------------------------|-----------|----------------------------|-------------|-----------------------------|-------------------|-----------------------|----------------------|--|------------------|
| yer  | 60-         | Location: See Exploration Plan               |                           |           | 1 A 1                      | 3           | el<br>ns                    | /pe               | st                    | Water<br>Content (%) | Atterberg<br>Limits  | 4                |
| Model Layer  | Graphic Log | Latitude: 35.7567° Longitude: -77.8993       | 0                         |           |                            | Depth (Ft.) | Water Level<br>Observations | Sample Type       | Field Test<br>Results | nt (                 | 12.0   | Percent<br>Fines |
| odel   | aph         |  |                           |           |                            | pth         | ater                        | Idmi              | Res                   | Wa                   | LL-PL-PI   | Perc             |
| Σ  | Ū           |  |                           |           |                            | ď           | ≥g                          | S                 | ш.                    | S                    |  |                  |
|  | 1 t.        | Depth (Ft.)<br>0.4 <b>TOPSOIL</b> , 5 inches |                           | Elevatior | n: 127 (Ft.) +/-<br>       |             |                             | -                 |                       |                      |  |                  |
|  |             | SILTY SAND (SM), brown, medi                 | ium dense                 |           | 120.0                      |             |                             |                   |                       |                      |  | 1                |
|  |             |  |                           |           |                            |             |                             | $\backslash$      | 3-5-6                 |                      |  |                  |
| 3  |             |  |                           |           |                            | _           |                             | XI                | N=11                  | 8.4                  | NP   | 29               |
|  |             | 3.0  |                           |           | 124                        |             |                             | Υ                 |                       |                      | 1  |                  |
|  | ////        | FAT CLAY (CH), brown to gray,                | medium stiff to s         | stiff     | 124                        | -           | 1                           |                   |                       |                      |  | ÷.               |
|  |             |  |                           |           |                            | ÷ .         | 238                         | М                 | 4-3-4                 |                      |  |                  |
|  |             |  |                           |           |                            |             |                             | $ \Lambda $       | N=7                   | ·                    |  |                  |
|  |             |  |                           |           | 8 v                        | 5 –         |                             |                   | 1                     | 1                    |  |                  |
|  |             |  |                           |           | - <sup>8</sup>             | _           |                             |                   | 1                     |                      | 1. A   |                  |
| 2  |             |  |                           |           |                            |             |                             | V                 | 1-4-5                 |                      |  |                  |
|  |             | . · · · · · · · · · · · · · · · · · · ·      |                           |           |                            |             |                             | $\mathbb{N}$      | N=9                   | ÷ 1                  |  |                  |
|  |             |  |                           |           |                            | _           |                             |                   | 1                     |                      |  |                  |
|  |             |  |                           |           | 8                          |             |                             |                   | 9<br>                 |                      |  | 1                |
|  |             |  |                           |           |                            |             | 1.                          | X                 | 3-4-6<br>N=10         | -                    |  |                  |
|  |             | 10.0   |                           |           | 117                        | 10-         |                             | $\langle \rangle$ | N=10                  |                      |  |                  |
|  |             | Boring Terminated at 10 Feet                 |                           |           |                            |             |                             |                   |                       | 1.5                  |  |                  |
|  |             |  |                           |           |                            |             |                             |                   |                       |                      |  |                  |
|  |             |  |                           |           | 1                          |             |                             |                   |                       |                      |  |                  |
|  |             |  |                           |           |                            |             |                             |                   |                       |                      |  |                  |
|  |             |  |                           |           |                            |             |                             |                   |                       |                      |  |                  |
|  |             |  |                           |           |                            |             |                             |                   |                       |                      | . <sup>8</sup>   | 1                |
|  |             |  |                           |           |                            |             |                             |                   |                       |                      | 1. E   |                  |
|  |             |  |                           |           |                            |             | (3)                         |                   |                       |                      |  |                  |
|  |             |  |                           |           |                            |             |                             |                   |                       | - 81                 |  |                  |
|  |             |  |                           |           |                            |             |                             |                   |                       |                      |  | 3                |
|  |             |  |                           |           |                            |             |                             |                   |                       |                      | , al.  |                  |
|  |             |  |                           |           |                            |             |                             |                   |                       |                      |  |                  |
|  |             |  |                           |           |                            |             |                             |                   |                       |                      |  |                  |
|  |             |  |                           |           |                            |             |                             |                   |                       | 1                    |  |                  |
|  |             | 2 T 10                                       |                           |           |                            |             |                             |                   |                       |                      |  |                  |
|  |             |  |                           |           |                            |             |                             |                   |                       |                      |  | -                |
|  | ~           |  |                           |           |                            |             |                             |                   |                       |                      |  |                  |
|  | *)          |  |                           |           |                            |             |                             |                   |                       |                      |  |                  |
|  |             |  |                           |           |                            |             |                             |                   |                       |                      |  |                  |
|  |             |  |                           |           |                            |             |                             |                   |                       |                      |  | -                |
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|  | 2           |  |                           |           |                            |             |                             |                   |                       |                      |  |                  |
| 1000   |             |  | Contraction of the second |           | And the second             |             |                             | CERCIC            |                       | THT A NEW H          |  | and the second   |
| See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any). |             |  |                           | ratory    | Water Level Of<br>Groundwa |             |                             | ntere             | d                     |                      | Drill Rig<br>Geoprobe 323  | ODT              |
| See Supporting Information for explanation of symbols and abbreviations.   |             |  |                           |           |                            |             |                             |                   |                       |                      | Hammer Typ   |                  |
|  |             |  |                           |           |                            |             |                             |                   |                       |                      | Automatic  |                  |
| Notes  |             |  |                           |           | Advancement I              | Method      |                             |                   |                       |                      | Driller<br>W. Duggins  |                  |
|  |             | eference: Elevations were interpolated from  | a topographic site        | e plan.   | 2 1/4 HSA                  | Hernod      |                             |                   |                       |                      | Logged by  |                  |
|  |             |  |                           |           |                            |             |                             |                   |                       |                      | Z. Marples   |                  |
|  |             |  |                           |           | Abandonment Method         |             |                             |                   |                       |                      | Boring Starte<br>12-05-2022  | ed               |
|  |             |  |                           |           | Boring backfilled          | with au     | lger c                      | utting            | s upon completion.    |                      | Boring Comp  | leted            |
|  |             |  |                           |           |                            |             |                             |                   |                       | 12-05-2022           | a de la composition de la comp |                  |

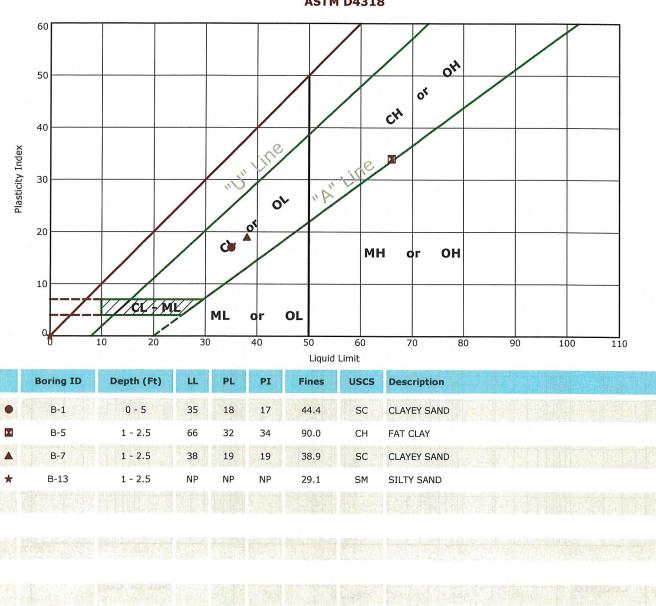


| Location: See Exploration Plan<br>Latitude: 35.7575° Longitude: -77.9022°<br>Depth (Ft.)<br>Location: 124 (Ft.) +/-<br>Depth (Ft.)<br>SANDY FAT CLAY (CH), brown to gray, medium stiff to stiff                       | ercent          |
|---|-----------------|
| Depth (Ft.)         Elevation: 124 (Ft.) +/-           123.7         123.7           SANDY FAT CLAY (CH), brown to gray, medium stiff to stiff         1-3-4           N=7         4-5-9           N=14         1-3-4 |                 |
| Depth (Ft.)         Elevation: 124 (Ft.) +/-           123.7         123.7           SANDY FAT CLAY (CH), brown to gray, medium stiff to stiff         1-3-4           N=7         4-5-9           N=14         1-3-4 |                 |
| 2 2 2 2 4-5-9<br>N=14   |                 |
| 2 SANDY FAT CLAY (CH), brown to gray, medium stiff to stiff   |                 |
| 2 N=7   |                 |
| 2 4-5-9<br>N=14   |                 |
| N=14  |                 |
| N=14  |                 |
| N=14  |                 |
|   |                 |
|   |                 |
| 118   |                 |
| SANDY FAT CLAY (CH), brown to gray, soft  |                 |
|   |                 |
|   |                 |
|   |                 |
| $ \times$ $1-1-1$ $N=2$   |                 |
|   |                 |
| Boring Terminated at 10 Feet  | 1.              |
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|   |                 |
| See Exploration and Testing Procedures for a description of field and laboratory Water Level Observations Drill Rice Compression  | g<br>De 3230DT  |
|   | er Type         |
| See Supporting Information for explanation of symbols and abbreviations. At completion of drilling Automa   | tic             |
| Driller<br>W. Dug   | gins            |
| Notes Advancement Method 2 1/4 HSA Logged   | by              |
| 2. Pap  |                 |
| Abandonment Method 12-06-2  | Started<br>2022 |
| Boring backfilled with auger cuttings upon completion.<br>12-06-2   | Completed       |

Gillette Athletic Complex - Pickleball and Tennis 3238 Corbett @verthedditt@ntson Terracon Project No. 70225204



### Atterberg Limit Results ASTM D4318



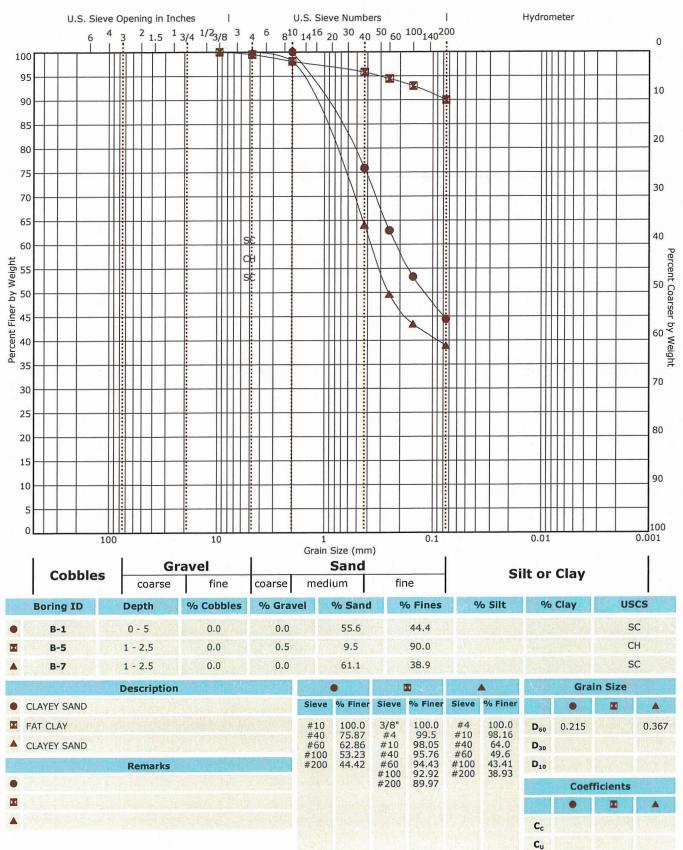
Laboratory tests are not valid if separated from original report.

Gillette Athletic Complex - Pickleball and Tennis 3238 Corbett Wer Mcdqiting Son Terracon Project No. 70225204



### **Grain Size Distribution**

ASTM D422 / ASTM C136



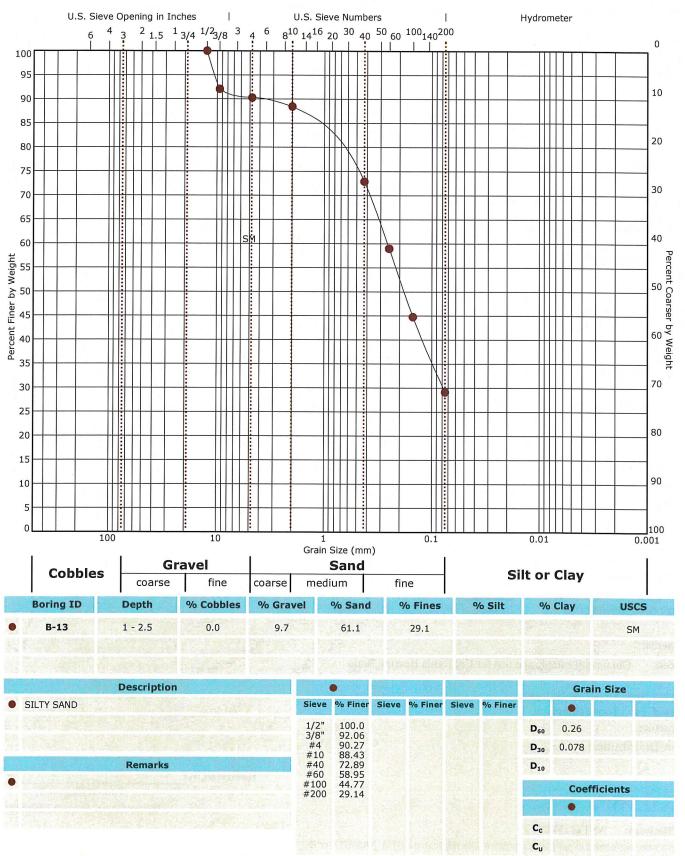
Laboratory tests are not valid if separated from original report.

Gillette Athletic Complex - Pickleball and Tennis 3238 Corbett ??? M≜d⊈itinn§on Terracon Project No. 70225204



## **Grain Size Distribution**

ASTM D422 / ASTM C136



Laboratory tests are not valid if separated from original report.

### **REPORT FOR CALIFORNIA BEARING RATIO**

| Service Date:       | 12/16/22 |
|---------------------|----------|
| <b>Report Date:</b> | 01/10/23 |

Green Engineering, PLLC

Wilson, North Carolina 27893

Attn: E. Leo Green, III

303 Goldsboro St. E

Client

2401 Brentwood Road, Suite 107 Raleigh, NC 27604 919-873-2211

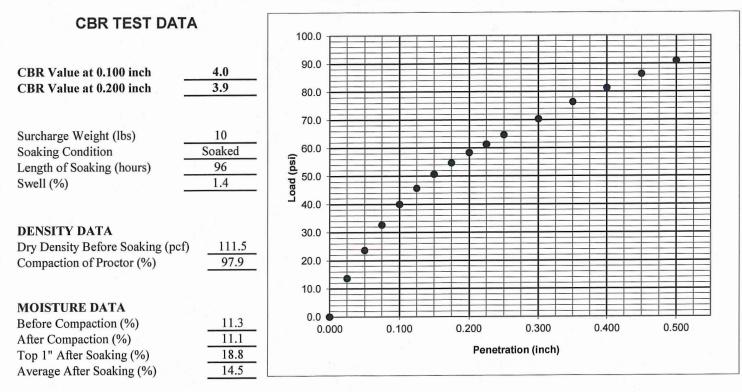
#### Project

Gillette Athletic Complex - Pickleball and Tennis Court Additions 3238 Corbett Ave. NE Wilson, North Carolina 27893

Project No. 70225204

### SAMPLE INFORMATION

| Sample Number:        | Bulk Sample            | Proctor Method: ASTM       | A D698 - Method A |
|-----------------------|------------------------|----------------------------|-------------------|
| Boring Number:        | B-1                    | Maximum Dry Density (pcf): | 113.9             |
| Sample Location:      | Auger #5               | Optimum Moisture:          | 12.4              |
| Depth:                | 1.0 - 5.0'             | Liquid Limit:              | 35                |
| Material Description: | Brown Clayey Sand (SC) | Plasticity Index:          | 17                |



#### **Comments:**

Services: Obtain soil sample and test for California Bearing Ratio

Terracon Rep: Stephanie Huffman Reported To: Tom Schipporeit Contractor: Report Distribution

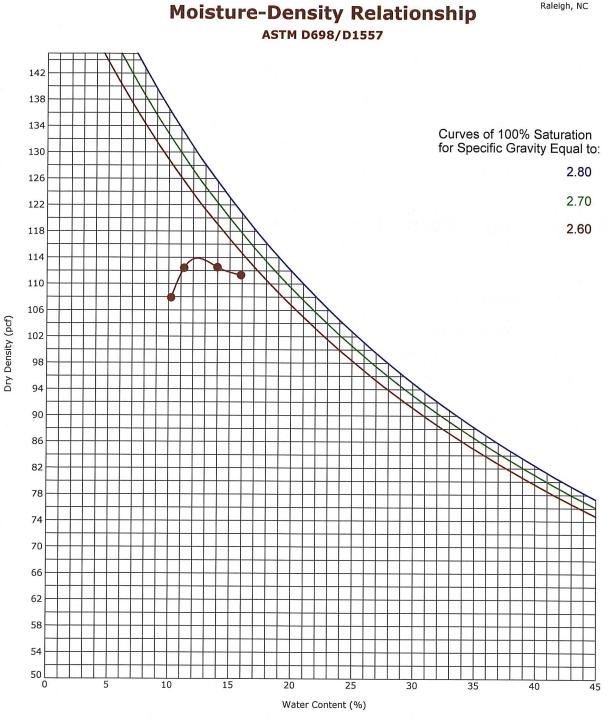
**Reviewed by:** 

Tom Schipporeit Geotechnical Project Manager

#### Test Methods: ASTM D1883

The tests were performed in general accordance with applicable ASTM, AASHTO, or DOT test methods. This report is exclusively for the use of the client indicated above and shall not be reproduced except in full without the written approval of Terracon. Test results transmitted herein are only applicable to the actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.





| Boring ID D  |                            |       | (Ft) |      | D                  | escription of Materials      |                              |
|--------------|----------------------------|-------|------|------|--------------------|------------------------------|------------------------------|
|              | B-1                        | 0 - 5 | 5    | 1920 |                    | CLAYEY SAND(SC)              |                              |
| Fines<br>(%) | Fraction<br>>19mm size (%) | LL    | PL   | PI   | Test Method        | Maximum Dry Density<br>(pcf) | Optimum Water Content<br>(%) |
| 44           | 56                         | 35    | 18   | 17   | ASTM D698 Method A | 113.9                        | 12.4                         |

Laboratory tests are not valid if separated from original report.

# **Supporting Information**

#### Contents:

General Notes Unified Soil Classification System

Note: All attachments are one page unless noted above.

# 2401 Brentwood Rd Ste 107 Raleigh, NC

### **General Notes**

| Sampling                      | Water Level   | Field Tests |   |  |
|-------------------------------|---|-------------|---|--|
|                               | Water Initially Encountered   | N           | Standard Penetration Test<br>Resistance (Blows/Ft.) |  |
| Auger<br>Cuttings Split Spoon | Water Level After a Specified Period of Time  | (HP)        | Hand Penetrometer                                   |  |
|                               | Water Level After<br>a Specified Period of Time   | (T)         | Torvane   |  |
|                               | Cave In<br>Encountered  | (DCP)       | Dynamic Cone Penetrometer                           |  |
|                               | Water levels indicated on the soil boring logs are the levels measured in the borehole at the times | UC          | Unconfined Compressive<br>Strength                  |  |
|                               | indicated. Groundwater level variations will occur over time. In low permeability soils, accurate   |             | Photo-Ionization Detector                           |  |
|                               | determination of groundwater levels is not possible with short term water level observations.       | (OVA)       | Organic Vapor Analyzer                              |  |

#### **Descriptive Soil Classification**

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

#### Location And Elevation Notes

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

| Strength Terms                           |  |  |   |   |  |  |  |  |
|--|--|--|---|---|--|--|--|--|
| (More than 50% ret<br>Density determined | of Coarse-Grained Soils<br>ained on No. 200 sieve.)<br>by Standard Penetration<br>sistance | Consistency of Fine-Grained Soils<br>(50% or more passing the No. 200 sieve.)<br>Consistency determined by laboratory shear strength testing, field visual-manu<br>procedures or standard penetration resistance |   |   |  |  |  |  |
| Relative Density                         | Relative Density Standard Penetration or<br>N-Value<br>(Blows/Ft.)                         |  | Unconfined Compressive Strength<br>Qu (tsf) | Standard Penetration or<br>N-Value<br>(Blows/Ft.) |  |  |  |  |
| Very Loose                               | 0 - 3  | Very Soft  | less than 0.25                              | 0 - 1   |  |  |  |  |
| Loose                                    | 4 - 9  | Soft   | 0.25 to 0.50                                | 2 - 4   |  |  |  |  |
| Medium Dense                             | 10 - 29  | Medium Stiff   | 0.50 to 1.00                                | 4 - 8   |  |  |  |  |
| Dense                                    | 30 - 50  | Stiff  | 1.00 to 2.00                                | 8 - 15  |  |  |  |  |
| Very Dense                               | > 50   | Very Stiff   | 2.00 to 4.00                                | 15 - 30   |  |  |  |  |
|  |  | Hard   | > 4.00                                      | > 30  |  |  |  |  |

#### **Relevance of Exploration and Laboratory Test Results**

Exploration/field results and/or laboratory test data contained within this document are intended for application to the project as described in this document. Use of such exploration/field results and/or laboratory test data should not be used independently of this document.

#### **Geotechnical Engineering Report**

Gillette Athletic Complex Additions | Wilson, North Carolina January 17, 2023 | Terracon Project No. 70225204

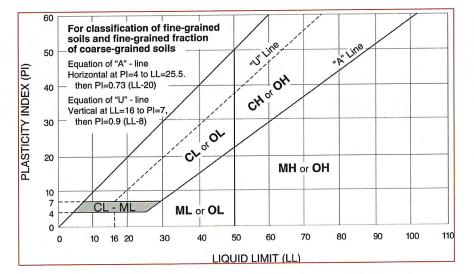
### **Unified Soil Classification System**

## Criteria for Assigning Group Symbols and Group Names Using

|  | Symbol  | Group Name B  |  |     |                                |
|--|---|---|--|-----|--------------------------------|
|  |   | Clean Gravels:  | Cu≥4 and 1≤Cc≤3 <sup>E</sup>                 | GW  | Well-graded gravel F           |
|  | Gravels:<br>More than 50% of                                      | Less than 5% fines c                                    | Cu<4 and/or [Cc<1 or Cc>3.0] E               | GP  | Poorly graded gravel F         |
|  | coarse fraction   |   | Fines classify as ML or MH                   | GM  | Silty gravel F, G, H           |
| Coarse-Grained Soils:                      | retained on No. 4<br>sieve  | Gravels with Fines:<br>More than 12% fines <sup>c</sup> | Fines classify as CL or CH                   | GC  | Clayey gravel F, G, H          |
| More than 50% retained<br>on No. 200 sieve | Sands:<br>50% or more of<br>coarse fraction<br>passes No. 4 sieve | Clean Sands:<br>Less than 5% fines <sup>D</sup>         | Cu≥6 and 1≤Cc≤3 <sup>■</sup>                 | SW  | Well-graded sand <sup>I</sup>  |
| 011 NO. 200 SIEVE                          |   |   | Cu<6 and/or [Cc<1 or Cc>3.0] E               | SP  | Poorly graded sand I           |
|  |   | Sands with Fines:<br>More than 12% fines <sup>D</sup>   | Fines classify as ML or MH                   | SM  | Silty sand <sup>G, H, I</sup>  |
|  |   |   | Fines classify as CL or CH                   | SC  | Clayey sand <sup>G, H, I</sup> |
|  | Silts and Clays:<br>Liquid limit less than<br>50                  | Inorganic:  | PI > 7 and plots above "A" line <sup>3</sup> | CL  | Lean clay <sup>K, L, M</sup>   |
|  |   |   | PI < 4 or plots below "A" line <sup>3</sup>  | ML  | Silt <sup>K, L, M</sup>        |
|  |   |   | LL oven dried                                | OL  | Organic clay K, L, M, N        |
| Fine-Grained Soils:                        | 50  | Organic:  | LL oven dried<br>LL not dried < 0.75         | UL  | Organic silt K, L, M, O        |
| 50% or more passes the                     | Silts and Clays:<br>Liquid limit 50 or                            |   | PI plots on or above "A" line                | СН  | Fat clay K, L, M               |
| No. 200 sieve                              |   | Inorganic:  | PI plots below "A" line                      | MH  | Elastic silt K, L, M           |
|  |   |   | LL oven dried                                | 011 | Organic clay K, L, M, P        |
|  | more  | Organic:  | LL oven dried<br>LL not dried < 0.75         | ОН  | Organic silt K, L, M, Q        |
| Highly organic soils:                      | PT  | Peat  |  |     |                                |

- A Based on the material passing the 3-inch (75-mm) sieve.
- в If field sample contained cobbles or boulders, or both, add "with
- cobbles or boulders, or both" to group name. <sup>c</sup> Gravels with 5 to 12% fines require dual symbols: GW-GM well-
- graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay. P Sands with 5 to 12% fines require dual symbols: SW-SM well-
- graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.
- $E Cu = D_{60}/D_{10}$  $CC = (D_{30})^2$ 
  - D<sub>10</sub> x D<sub>60</sub>
- F If soil contains ≥ 15% sand, add "with sand" to group name.
- <sup>G</sup> If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

- <sup>H</sup> If fines are organic, add "with organic fines" to group name.
- I If soil contains ≥ 15% gravel, add "with gravel" to group name.
- <sup>3</sup> If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.
- K If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.
- If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.
- <sup>M</sup> If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.
- <sup>▶</sup> PI ≥ 4 and plots on or above "A" line.
- PI < 4 or plots below "A" line.
- P PI plots on or above "A" line.
- Q PI plots below "A" line.





Soil Classification