

**CONTRACT DOCUMENTS AND SPECIFICATIONS**

**FOR**

**PHASE IIA AND III ROADWAY, WATER AND  
WASTEWATER IMPROVEMENTS**

**MID-CAROLINA COMMERCE PARK**

**FOR**

**NEWBERRY COUNTY, SOUTH CAROLINA**



**Newberry County**  
**Economic Development**  
S O U T H C A R O L I N A

**ALLIANCE CONSULTING ENGINEERS, INC.**  
**PROJECT NO. 17113-0036**  
**BID DOCUMENT NO.: 2021-11**

**MAY 2021**

**BID DOCUMENTS**

CONTRACTOR:

ADDRESS:

CONTRACTOR'S LICENSE NUMBER:



Alliance Consulting Engineers, Inc.  
Post Office Box 8147  
Columbia, SC 29202-8147  
(803) 779-2078 • (803) 779-2079 fax  
[www.allianceCE.com](http://www.allianceCE.com)

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**MID-CAROLINA COMMERCE PARK**

**FOR**

**NEWBERRY COUNTY, SOUTH CAROLINA**



**Newberry County  
Economic Development**

SOUTH CAROLINA

**Prepared For:**

Newberry County Economic Development  
Post Office Box 381  
Newberry, South Carolina 29108



**Prepared By:**

Alliance Consulting Engineers, Inc.  
Post Office Box 8147  
Columbia, South Carolina 29202-8147  
Project No. 17113-0036  
Newberry County Bid Number: 2021-11



*Benjamin S. Whaley*



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MID-CAROLINA COMMERCE PARK**

**FOR**

**NEWBERRY COUNTY, SOUTH CAROLINA**

**PROJECT NO. 17113-0036**

**Bid Document No.: 2021-11**

**May 2021**

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### ADVERTISEMENT FOR BID

Owner: Newberry County, South Carolina

Bid Document No.: 2021-11

Engineers: Alliance Consulting Engineers, Inc.

Project No.: 17113-0036

Separate sealed bids (Bid Document Number 2021-11) for Phase IIA and III Roadway, Water and Wastewater Improvements Mid-Carolina Commerce Park for Newberry County, South Carolina will be received at the offices of Newberry County Courthouse Annex Conference Room located at 1309 College Street in Newberry, South Carolina 29108 by Ms. Crystal Waldrop, Purchasing Director until **3:00 P.M. on Thursday, June 24, 2021** after which will be publicly opened and read aloud at the Newberry County Courthouse Annex Conference Room. The bids must be received at the Purchasing Department in the Newberry County Courthouse Annex Building. The work to be completed as a part of this project consists of providing all required materials, equipment, all related appurtenances, and labor necessary to complete the Improvements of the Phase IIA and III Roadway, Water and Wastewater Improvements at the Mid-Carolina Commerce Park for Newberry County, South Carolina, with the following approximate quantities:

Base Bid: The proposed improvements include:

**Roadway:** approximately 2,315 linear feet of 30-foot wide, 2-lane roadway to include two (2) new arch culvert structures with headwalls

**Water:** approximately 2,265 linear feet of 12-inch DIP

**Wastewater:** approximately 1,275 linear feet of 8-inch PVC gravity main

Base Bid Alternate 1: The proposed improvements include:

**Roadway:** approximately 1,100 linear feet of 30-foot wide, 2-lane roadway

**Water:** approximately 1,100 linear feet of 12-inch DIP

Bidders on this work will be required to comply with the President's Executive Order No. 11246 and Order No. 11375, which prohibit discrimination in employment regarding race, creed, color, sex, or national origin.

The Instructions to Bidders, Bid Form, Contract, Plans, Specifications, Bid Bond, Performance Bond, Payment Bond, Addendum, Notice of Intent to Award and other contract documents may be examined at the following locations:

HCAC and iSqFt Planroom Partnership: [hcacarolinas@isqft.com](mailto:hcacarolinas@isqft.com)

Dodge Plan Rooms: [Dodge.Docs@construction.com](mailto:Dodge.Docs@construction.com)

Owner: [www.newberrycounty.net/departments/purchasing](http://www.newberrycounty.net/departments/purchasing)

Engineers: Alliance Consulting Engineers, Inc., Columbia, SC P.O. Box 8147 Columbia, SC 29202-8147

Drawings, specifications, and contract documents may be obtained from the office of Alliance Consulting Engineers, Inc., Post Office Box 8147, Columbia, SC 29202-8147 upon a non-refundable payment of \$300. When requesting drawings, specifications, or contract documents, provide the following information about your company: Mailing address; street (UPS) address; telephone number; and FAX number (if applicable).

Bidders must deposit security with all bids. Security shall be in the form of a certified check or bid bond made payable to the Owner and shall be for an amount equal to not less than five percent (5%) of the amount of the bid. Provisions of the security shall be as described in the Information for Bidders.

No bid will be considered unless the bidder is legally qualified under the provisions of the South Carolina Contractor's Licensing Law (South Carolina Code of Laws as amended on April 1, 1999, Chapter 11, Sections 40-11-10 through 40-11-428).

**NOTICE TO BIDDERS:**

There will be a NON-MANDATORY Pre-bid Conference for this project. The non-mandatory Pre-Bid will be held on **Thursday, June 10, 2021 at 2:00 PM** at the offices of Newberry County Courthouse Annex Conference Room located at 1309 College Street in Newberry, South Carolina 29108. Due to the importance of all bidders having a clear understanding of the scope and requirements for this contract, attendance at this meeting will be strongly encouraged for bidding on this contract. Attendance at the conference, while not required, will be evidenced by the representative's signature on the attendance roster. The questions deadline will be **Thursday, June 17, 2021 by 5:00 PM**.

**NOTICE TO BIDDERS:** Each bidder shall fully acquaint himself with the conditions relating to the scope and restrictions attending the execution of the work under the conditions of this Bid. The failure or omission of a bidder to acquaint himself with existing conditions shall in no way relieve him of any obligation with respect to this Bid or to the contract. All amendments to and interpretations of this solicitation shall be in writing and issued by Alliance Consulting Engineers, Inc. Newberry County or Alliance Consulting Engineers, Inc. shall not be legally bound by any amendment or interpretation that is not in writing. Award of the project is contingent on funding approval by the Newberry County Council and will be based on the total cost of the base bid and each approved alternate scope of work.

Contractors shall have a proper and active South Carolina License Classification to complete this project.

No bid may be withdrawn within a period of sixty (60) days after the actual date of the opening and thereof.

The Owner reserves the right to waive any informalities or to reject any or all bids.

**ENGINEERS**

Alliance Consulting Engineers, Inc.  
Post Office Box 8147  
Columbia, South Carolina 29202-8147  
1201 Main Street, Suite 2020 (Physical/FedEx)  
Columbia, South Carolina 29201-8147

**OWNER**

Newberry County  
Post Office Box 156 (Mailing)  
1309 College Street (Physical)  
Newberry, South Carolina 29108

**SECTION 00 21 13**

**INSTRUCTIONS TO BIDDERS**

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## **ARTICLE 1 - DEFINED TERMS**

- 1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:
- A. Issuing Office - The office from which the Bidding Documents are to be issued and where the bidding procedures are to be administered.

## **ARTICLE 2 - COPIES OF BIDDING DOCUMENTS**

- 2.01 Complete sets of the Bidding Documents in the number and for the deposit sum, if any, stated in the Advertisement or Invitation to Bid may be obtained from Alliance Consulting Engineers, Inc., P.O. Box 8147, Columbia, South Carolina 29202-8147. The deposit will be nonrefundable, and a FedEx account number must be provided for FedEx delivery of Plan Sets.
- 2.02 Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
- 2.03 Owner and Engineer, in making copies of Bidding Documents available on the above terms, do so only for the purpose of obtaining Bids for the Work and do not 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, within five (5) days of Owner's request, Bidder shall submit written evidence such as financial data, previous experience, and present commitments.

## **ARTICLE 4 - EXAMINATION OF BIDDING DOCUMENTS, OTHER RELATED DATA, AND SITE**

- 4.01 Subsurface and Physical Conditions
- A. The General Conditions identify:
1. The reports of explorations and tests of subsurface conditions at or contiguous to the Site that Engineer has used in preparing the Bidding Documents.
  2. The 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 are included herein. 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. 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 others.

- 4.03 Hazardous Environmental Condition
- A. The General 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. 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. 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. Bidder shall comply with all applicable Laws and Regulations relative to excavation and utility locates. Engineer and Owner shall be notified prior to any site visits.
- 4.06 Reference is made to Article 7 of the General 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 contemplated by these Bidding Documents. 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 the responsibility of each Bidder before submitting a Bid to:
- A. Examine and carefully study the Bidding Documents, the other related data identified in the Bidding Documents, and any Addenda.
  - 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, and performance of the Work.
  - D. Carefully study 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 Paragraph 4.02 of the General Conditions, and (2) reports and drawings of Hazardous Environmental Conditions at the Site which have been identified in Paragraph 4.06 of the General Conditions.

- E. Obtain and carefully study (or accept consequences of not doing so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site, which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying any specific means, methods, techniques, 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(s) 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.
  - 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 any specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by the Bidding Documents, that Bidder has given Engineer written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has discovered in the Bidding Documents and the written resolutions thereof by Engineer are acceptable to Bidder, and that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

#### **ARTICLE 5 - SITE AND OTHER AREAS**

- 5.01 The Site is identified in the Bidding Documents. Easements 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. All additional land 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.

#### **ARTICLE 6 - INTERPRETATIONS AND ADDENDA**

- 6.01 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 seven (7) 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.

- 6.02 Addenda may be issued to clarify, correct, or change the Bidding Documents as deemed advisable by Owner or Engineer.

#### **ARTICLE 7 - BID SECURITY**

- 7.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of five percent (5%) of Bidder's maximum Bid price and in the form of a certified check, bank money order, or a Bid Bond (on the form attached) issued by a surety meeting the requirements of Paragraphs 5.01 and 5.02 of the General Conditions.
- 7.02 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 fifteen (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 (7) days after the Effective Date of the Agreement or sixty-one (61) days after the Bid opening, whereupon Bid security furnished by such Bidders will be returned.
- 7.03 Bid security of other Bidders whom Owner believes do not have a reasonable chance of receiving the award will be returned within seven (7) days after the Bid opening.

#### **ARTICLE 8 - CONTRACT TIMES**

- 8.01 **The Phase IIA and III Roadway, Water and Wastewater Improvements at the Mid-Carolina Commerce Park for Newberry County, South Carolina is to be completed within two hundred and seventy (270) days after the Notice to Proceed has been issued. Issuance of the Notice to Proceed shall be issued after the Notice of Intent to Award has been issued and the ten (10) day protest period has passed County Council.**

#### **ARTICLE 9 - LIQUIDATED DAMAGES**

- 9.01 Provisions for liquidated damages are set forth in the Agreement.

#### **ARTICLE 10 - SUBSTITUTE AND "OR-EQUAL" ITEMS**

- 10.01 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 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 the receipt of Bids. No items 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 11 - SUBCONTRACTORS, SUPPLIERS, AND OTHERS

- 11.01 If the General 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 (5) 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, in which case apparent Successful Bidder shall submit an acceptable substitute, without an increase in Bid.
- 11.02 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers, individuals, or entities. 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 or 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.
- 11.03 Contractor shall not be required to employ any Subcontractor, Supplier, individual, or entity against whom Contractor has reasonable objection.
- 11.04 Each bidder shall fully acquaint himself with conditions of this Bid. The failure or omission of a bidder to acquaint himself with existing conditions shall in no way relieve him of any obligation with respect to this Bid or to the Contract. The deadline for submitting questions is **Thursday, June 17, 2021 at 5:00 PM** in the form of an email. The questions will be sent to Newberry Purchasing department to Ms. Crystal Waldrop at [cwaldrop@newberrycounty.net](mailto:cwaldrop@newberrycounty.net), Ms. Karen Brehmer at [kbrehmer@newberrycounty.net](mailto:kbrehmer@newberrycounty.net) and Debbie Cromer at [dcromer@newberrycounty.net](mailto:dcromer@newberrycounty.net) and forwarded to the engineer for answers. No phone calls will be accepted by the engineer.

## ARTICLE 12 - PREPARATION OF BID

- 12.01 The Bid Form is included with the Bidding Documents. Additional copies may be obtained from Engineer.
- 12.02 All blanks on the Bid Form shall be completed by printing in ink or by typewriter and the Bid signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form. A Bid price shall be indicated for each unit price item listed therein, or the words "No Bid," "No Change," or "Not Applicable" entered.
- 12.03 A Bid by a corporation shall be executed in the corporate name by the president, vice-president, or other corporate officer accompanied by evidence of authority to sign. The corporate seal shall be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown below the signature.
- 12.04 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.
- 12.05 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 shall be shown below the signature.

- 12.06 A Bid by an individual shall show the Bidder's name and official address.
- 12.07 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 shall be shown below the signature.
- 12.08 All names shall be typed or printed in ink below the signatures.
- 12.09 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid Form.
- 12.10 The postal address and telephone number for communications regarding the Bid shall be shown.
- 12.11 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, if any, shall also be shown on the Bid Form.

### **ARTICLE 13 - BASIS OF BID; COMPARISON OF BIDS**

- 13.01 Unit Price
- 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 the sum of the products of the estimated quantity of each item and the corresponding unit price. 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.
- 13.02 The Bid price shall include such amounts as the Bidder deems proper for overhead and profit on account of cash allowances, if any, named in the Contract Documents as provided in Paragraph 11.02 of the General Conditions.

### **ARTICLE 14 - SUBMITTAL OF BID**

- 14.01 With each copy of the Bidding Documents, a Bidder is furnished one (1) separate unbound copy of the Bid Form, and, if required, the Bid Bond Form. The unbound copy of the Bid Form is to be completed and submitted with all the attachments outlined in Article 7 of the Bid Form.
- 14.02 A Bid shall be submitted no later than the date and time prescribed and at the place indicated in the Advertisement for Bids 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 package plainly marked on the outside with the notation "BID ENCLOSED". When using the mail or other delivery system, the Bidder is totally responsible for the mail or other delivery system delivering the Bid at the place and prior to the time indicated in the Advertisement for Bid. A mailed Bid shall be addressed to Owner at address in Article 1.01 of Bid Form.

## **ARTICLE 15 - MODIFICATION AND WITHDRAWAL OF BID**

15.01 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.

15.02 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. The provision to withdraw a Bid without forfeiting the Bid security does not apply to Bidder's errors in judgment in preparing the bid.

## **ARTICLE 16 - OPENING OF BIDS**

16.01 Bids will be opened at the time and place indicated in the Advertisement or Invitation to Bid 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 in the form of a Bid Tabulation and Bid Comparison. The Bid Opening Minutes will also be provided to all in attendance.

## **ARTICLE 17 - BIDS TO REMAIN SUBJECT TO ACCEPTANCE**

17.01 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 18 - EVALUATION OF BIDS AND AWARD OF CONTRACT**

18.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, non-responsive, 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 not be responsible. Owner may also reject the Bid of any Bidder if Owner believes that it would not be in the best interest of the Project to make an award to that Bidder. Owner also reserves the right to waive all informalities not involving price, time, or changes in the Work and to negotiate contract terms with the Successful Bidder.

18.02 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.

18.03 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.

18.04 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 General Conditions.

18.05 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.

18.06 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 Instructions to Bidders, is lowest price,

and other factors considered. If detailed in the bid form, factors such as discounts, transportation costs, and life cycle costs may be used to determine which bidder, if any, is to be offered award.

18.07 The Owner reserves the right not to Award the Project.

#### **ARTICLE 19 - CONTRACT SECURITY AND INSURANCE**

19.01 Article 5 of the General Conditions sets forth Owner's requirements as to performance and payment bonds and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it shall be accompanied by such bonds.

#### **ARTICLE 20 - SIGNING OF AGREEMENT**

20.01 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 10 days thereafter, Owner shall deliver one (1) fully signed counterpart to Successful Bidder with a complete set of the Drawings with appropriate identification.

#### **ARTICLE 21 – RETAINAGE**

21.01 Retainage from progress payments to the Contractor shall be ten percent (10%) of each payment for work completed and stored materials on site.

**END OF SECTION**



## **INSTRUCTIONS TO BIDDERS**

1. Only one copy of bid is required unless otherwise specified.
2. Bids, amendments thereto or withdrawal request must be received by the time advertised for bid openings to be timely filed. It is the vendor's sole responsibility to insure that these documents are received by the purchasing office at the time indicated in the bid document.

**PLEASE NOTE THE VENDOR IS ULTIMATELY RESPONSIBLE FOR VERIFYING THEY HAVE RECEIVED ANY/ALL ADDENDA PRIOR TO THE BID OPENING.**

3. When specifications or descriptive papers are submitted with the bid, enter bidder's name thereon.
4. Submit your signed bid on the bidder's schedule provided. Show bid number on envelope as instructed and the bid name or description. Newberry County accepts no responsibility for unmarked or improperly marked envelopes.
5. Bidders must clearly mark as "Confidential" each part of their bid which they consider to be proprietary information that could be exempt from disclosure under Section 30-4-40 Code of Laws of South Carolina, 1976, as amended, (also known as the Freedom of Information Act). The County reserves the right to determine whether this information should be exempt from disclosure and no legal action may be brought against the County or its agents for its determination in this regard.
6. By submission of a bid, you are guaranteeing that all goods and services meet the requirements of the solicitation during the contract period.
7. Tie bids will be resolved in accordance with the provisions of the Newberry County Purchasing Ordinance.
8. A copy of the bidder's W-9 shall be included in the submission.

## **GENERAL PROVISIONS**

1. The County of Newberry reserves the right to reject any and all bids, to cancel a solicitation, and to waive any technicality if deemed to be in the best interest of the County.
2. Unit prices will govern over extended prices unless otherwise stated in this bid invitation.
3. **PROHIBITION OF GRATUITIES:** South Carolina law and the Newberry County Purchasing Ordinance prohibit the giving of anything of value in return for favors or other preferential treatment in the purchasing process. Bidders should govern themselves accordingly.

4. **BIDDERS QUALIFICATION:** Bidders must, upon request of the county, furnish satisfactory evidence of their ability to furnish products or services in accordance with the terms and conditions of these specifications. The County reserves the right to make the final determination as to the bidder's ability to provide the products or services requested herein. Bidder determined to be irresponsible bidders are not allowed to bid to provide the County goods or services.
5. **BIDDERS RESPONSIBILITY:** Each bidder shall fully acquaint himself with conditions relating to the scope and restrictions attending the execution of the work under the conditions of this bid. It is expected that this will sometimes require on-site observation. The failure or omission of a bidder to acquaint himself with existing conditions shall in no way relieve him of any obligation with respect to this bid or to the contract.
6. **AWARD CRITERIA:** The contract shall be awarded to the lowest responsible and responsive bidder(s) whose bid meets the requirements and criteria set forth in the Invitation for Bid. Award may be made to one or a multiple of bidders, whichever deems to be in the best interest of the County, or unless otherwise stated on the bidder's schedule.
7. **WAIVER:** The County reserves the right to waive any Instruction to Bidders, General or Special Provisions, General or Special Conditions, or specifications deviation if deemed to be in the best interest of the county.
8. **COMPETITION:** This solicitation is intended to promote competition. If any language, specifications, terms and conditions, or any combination thereof restricts or limits the requirements in this solicitation to a single source, it shall be the responsibility of the interested vendor to notify the Purchasing Director on in writing within five (5) days prior to the opening date. The solicitation may or may not be changed but a review of such notification will be made prior to the award.
9. **REJECTION:** Ambiguous bids which are uncertain as to terms, delivery, quantity, or compliance with specifications may be rejected or otherwise disregarded if such action is in the best interest of the County.
10. **RIGHT TO PROTEST:** Any prospective bidder, offeror, or contractor, who is aggrieved in connection with the solicitation of a contract shall protest in writing to the Purchasing Director within ten (10) calendar days of the date of issuance of the Invitation to Bid or other solicitation documents, whichever is applicable, or any amendment thereto, if the amendment is at issue. Any actual bidder, offeror, or contractor, who is aggrieved in connection with the intended award or award of a contract, shall protest in writing to the purchasing director within ten (10) calendar days of the notification of intent to award or statement of award.

11. **PROTEST PROCEDURE:** A protest shall be in writing, submitted to the purchasing director, and shall set forth the specific grounds of the protest with enough particularity to give notice to the issues to be decided.

### **GENERAL CONDITIONS**

1. **DEFAULT:** In case of default by the contractor, the County reserves the right to purchase any or all items in default in the open market, charging the contractor with any excessive costs. Should such charge be assessed, no subsequent bids of the defaulting contractor will be considered until the assessed charge has been satisfied.
2. **NON-APPROPRIATION:** Any contract entered into by the County resulting from this bid invitation shall be subject to cancellation without damages or further obligation when funds are not appropriated or otherwise made available to support continuation of performance in a subsequent fiscal period or appropriated year.
3. **HOLD HARMLESS AND INSURANCE:** The successful bidder shall indemnify and hold harmless the County of Newberry and all County officers, agents and employees against all suits or claims for personal injury or property damage resulting from, or arising from, the successful bidder's performance of the contract, as well as against any suits or claims of any character brought against the County or its agents or employees by reason of any claim of infringement of any patent, trade mark, trade dress, or copyright, including reimbursement to the County for all attorneys fees and court costs incurred by the County in defending itself or its agents or employees against any such claim or suit. **In addition, the successful bidder will maintain a public liability policy with minimum limits of \$500,000 per occurrence, or \$1,000,000 single limit, for damages arising from acts which occur during the contract period, with the County of Newberry named as an additional insured on the policy; the successful bidder shall also maintain workers compensation and vehicle liability insurance in the amounts required by statutory law.** Proof of such coverage will be provided upon demand or as otherwise provided in the bid specifications.
4. **CONTRACT ADMINISTRATION:** Questions or problems arising after award of this contract shall be directed to the Purchasing Director, P.O. Box 156, Newberry, SC 29108, or by calling 803-321-1420.
5. **FORCE MAJEURE:** The Contractor shall not be liable for any excess costs if the failure to perform the contract arises out of causes beyond the control and without fault or negligence of the contractor. Such causes may include, but are not restricted to acts of God or of a public enemy, acts of Government in either its sovereign or contractual capacity, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and unusually severe weather; but in every case the failure to perform must be beyond the control and

without the fault or negligence of the contractor. If the failure to perform is caused by default of a subcontractor, and if such default arises out of causes beyond the control of both the contractor and subcontractor and without excess costs for failure to perform, unless the supplies or services to be furnished by the subcontractor were obtainable from other sources in sufficient time to permit the contractor to meet the required delivery schedule.

6. **PUBLIC RELEASE:** Contractor agrees not to refer to award of this contract in commercial advertising in such a manner as to state or imply that the products or services provided are endorsed or preferred by the User.
  
7. **QUALITY OF PRODUCT:** Unless otherwise indicated in this bid it is understood and agreed that any items offered or shipped on this bid shall be new, in first class condition, and without defect that all containers shall be new and suitable for storage or shipment, and that prices include standard commercial packaging and shipping to the specified destination in Newberry County. No demonstration models shall be sold as new, without prior written permission of the County.
  
8. **S.C. LAW CLAUSE:** Upon award of a contract under this bid, the person, partnership, association or corporation to whom the award is made must comply with the laws of South Carolina which require such person or entity to be authorized and/or licensed to do business with this State. Notwithstanding the fact that applicable statutes may exempt or exclude the successful bidder from requirements that it be authorized and/or licensed to do business in this State, by submission of this signed bid, the bidder agrees to subject himself to the jurisdiction and process of the courts of the State of South Carolina as to all matters and disputes arising or to arise under the contract and the performance thereof, including any questions as to the liability for taxes, licenses, or fees levied by the State.
  
9. **ASSIGNMENT:** No contract or its Provisions may be assigned, sublet, or transferred without the written consent of the Purchasing Director.
  
10. **AFFIRMATIVE ACTION:** The successful bidder will take affirmative action in complying with all Federal and State requirements concerning fair employment of the handicapped, and concerning the treatment of all employees, without regard or discrimination by reason of race, color, religion, sex, national origin or physical handicap.
  
11. **DELIVERIES:** All deliveries shall be FOB Destination. It is agreed by the parties hereto that delivery by the contractor to the common carrier does not constitute delivery to the County. Any claim for loss or damage shall be between the contractor and the carrier.

12. **APPROPRIATE S.C. SALES TAXES, FEES AND PERMITS** shall be included in the Contractor's base bid for all materials. All fees, including permits and any removal or disposal of construction debris shall be included in the contractor's bid.
13. **PAYMENT TERMS:** Payment will be made when all work is completed and accepted by Newberry County as meeting the specifications here within.
14. **BID BOND:** For each bid in excess of \$25,000.00 each bidder will submit with their bid a bond in the amount of 5% of the total price of the bid submitted. The bid bonds will be returned to the unsuccessful bidders once the county accepts the lowest most responsive bid. If the most responsive bidder fails to perform the responsibility of the bid within 10 days of the award, then the bid bond will be forfeited to the county as liquidated damages and the next lowest bidder will be awarded the bid. Bid bonds may be in the form of a surety, a cashier's check or an unconditional letter of credit in favor of Newberry County issued by a commercial bank in South Carolina.
15. **PERFORMANCE AND PAYMENT BONDS:** The chosen vendor will be required to submit to the County both a performance bond and payment bond in the amount of 100% of the contract price before commencing with the work. **Both bonds will be issued from a surety company with an "A" minimum rating of performance as stated in the most current publication of Best Key Rating Guide, Property Liability.**
16. **Compliance with The South Carolina Illegal Immigration Act:** By submitting an offer, Bidder certifies that it will comply with the applicable requirements of Title 8, Chapter 14 of the South Carolina code of Laws (originally enacted as Section 3 of The South Carolina Illegal Immigration act, 2008 S.C. Act No. 280) and agrees to provide upon request any documentation required to establish either: (a) the applicability of Title 8, Chapter 14 to Bidder and any subcontractor or sub-subcontractors; or (b) the compliance with Title 8, Chapter 14 by Bidder and any subcontractors or sub-subcontractors. Pursuant to Section 8-14-60, "A person who knowingly makes or files any false, fictitious, or fraudulent document, statement, or report pursuant to this chapter is guilty of a felony and, upon conviction, must be fined within the discretion of the court or imprisoned for not more than five years, or both". Bidder agrees to include in any contracts with its subcontractors language requiring the subcontractors to (a) comply with the applicable requirements of Title 8, Chapter 14, and (b) include in any contracts with the sub-subcontractors language requiring the sub-subcontract to comply with the applicable requirements of Title 8, Chapter 14.

**SECTION 00 41 00  
BID FORM**

**PHASE IIA AND III ROADWAY, WATER AND WASTEWATER IMPROVEMENTS**

**MID-CAROLINA COMMERCE PARK**

**FOR**

**NEWBERRY COUNTY, SOUTH CAROLINA  
BID DOCUMENT NO.: 2021-11**

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**ARTICLE 1 - BID RECIPIENT**

1.01 This Bid is submitted to: Newberry County  
P.O. Box 156 (Mailing Address)  
1309 College Street (Physical Address)  
Newberry, South Carolina 29108

1.02 Bids are to be delivered to: Newberry County  
Ms. Crystal Waldrop, Purchasing Director  
1309 College Street (Physical Address)  
Newberry, South Carolina 29108

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

**ARTICLE 2 - BIDDER'S ACKNOWLEDGEMENTS**

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

**ARTICLE 3 - BIDDER'S REPRESENTATIONS**

3.01 In submitting this Bid, Bidder represents that:

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

Addendum No.	Addendum Date	Initials
_____	_____	_____
_____	_____	_____
_____	_____	_____

- 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 Paragraph 4.02 of General Conditions, and (2) reports and drawings of Hazardous Environmental Conditions that have been identified in Paragraph 4.06 of General Conditions.
- E. Bidder has obtained and carefully studied (or accepts the consequences for not doing so) all additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the Site, which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying 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 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.
- K. Bidder will submit written evidence of its authority to do business in the state where the Project is located not later than the date of its execution of the Agreement.

#### **ARTICLE 4 - FURTHER REPRESENTATIONS**

4.01 Bidder further represents that:

- A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation.
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding.
- D. Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over Owner.



**ARTICLE 5 - BASIS OF BID**

**Base Bid**

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

Phase IIA and III Roadway, Water and Wastewater Improvements Mid-Carolina Commerce Park for Newberry County, South Carolina					
DIVISION IA - PHASE IIA ROADWAY IMPROVEMENTS (APPROXIMATELY 350-LF OF THIRTY (30)-FOOT WIDE, TWO (2)-LANE ROADWAY)					
Item No.	Description	Unit	Estimated Quantity	Unit Price	Bid Price
1	Mobilization/Bonds	LS	1	\$	\$
2	Clearing and Grubbing (Right-of-Way)	AC	1.5	\$	\$
3	Earthwork (Excavation/Haul/Backfill/Compaction of Select Fill Import/Soil Amendments) – Unclassified	LS	1	\$	\$
4	8-inch Graded Aggregate Base Course	SY	1,210	\$	\$
5	4-inch Asphalt Binder Course (Type B)	SY	1,170	\$	\$
6	2-inch Asphalt Surface Coarse (Type B)	SY	1,170	\$	\$
7	Rip Rap	SY	10	\$	\$
8	Construction Entrance	EA	1	\$	\$
9	Silt Fencing	LF	155	\$	\$
10	Erosion Control Slope Matting – Green Armor – Enka Mat or approved equal	SY	1,540	\$	\$
11	Erosion Control Channel Liner – Green Armor – 7520 or approved equal	SY	600	\$	\$
12	Inlet Protection	EA	1	\$	\$
13	Drop Inlet	EA	1	\$	\$
14	18-inch RCP	LF	88	\$	\$
15	Striping & Signage (To Include Centerline Striping, Edge Striping, and Stop Bar per SCDOT - "Road Ends" Barricade/Signage)	LS	1	\$	\$
16	Grassing	AC	1	\$	\$
Division IA Subtotal:				\$	

Total Bid in Words

\_\_\_\_\_ Dollars \_\_\_\_\_ Cents  
 (\$ \_\_\_\_\_ )

Upon the receipt of the bids, Newberry County shall review the bids received and determine the scope of work for this project based on the available budget for the project. The contract for this project shall be awarded to the low bidder for the project scope as determined by the sum total of the base bid portion or the combined sum of the base bid and approved base bid alternates depending on the scope of the project selected.

The above unit prices shall include all labor, materials, bailing, shoring, removal, overhead, profit, insurance, etc., to complete the finish work as stipulated in the Bid Documents.

Unit Prices have been computed in accordance with Paragraph 11.03.B of the General Conditions.

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, determined as provided in the Contract Documents.

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

Phase IIA and III Roadway, Water and Wastewater Improvements Mid-Carolina Commerce Park for Newberry County, South Carolina					
<b>DIVISION IB – PHASE IIA ON-SITE WATER IMPROVEMENTS (APPROXIMATELY 300-LF OF 12-INCH WATER MAIN)</b>					
Item No.	Description	Unit	Estimated Quantity	Unit Price	Bid Price
1	Mobilization/Bonds	LS	1	\$	\$
2	12-inch DIP Water Main (Including Fittings / Appurtenances)	LF	300	\$	\$
3	12-inch Gate Valves	EA	2	\$	\$
4	12-inch Tee	EA	1	\$	\$
5	12-inch 45° Bend	EA	4	\$	\$
6	12-inch Plug	EA	1	\$	\$
7	Connect to Existing System	LS	1	\$	\$
Division IB Subtotal:				\$	

Total Bid in Words

\_\_\_\_\_ Dollars \_\_\_\_\_ Cents  
 (\$ \_\_\_\_\_ )

Upon the receipt of the bids, Newberry County shall review the bids received and determine the scope of work for this project based on the available budget for the project. The contract for this project shall be awarded to the low bidder for the project scope as determined by the sum total of the base bid portion or the combined sum of the base bid and approved base bid alternates depending on the scope of the project selected.

The above unit prices shall include all labor, materials, bailing, shoring, removal, overhead, profit, insurance, etc., to complete the finish work as stipulated in the Bid Documents.

Unit Prices have been computed in accordance with Paragraph 11.03.B of the General Conditions.

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, determined as provided in the Contract Documents.

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

Phase IIA and III Roadway, Water and Wastewater Improvements Mid-Carolina Commerce Park for Newberry County, South Carolina					
<b>DIVISION IIA – PHASE IIIA ROADWAY IMPROVEMENTS (APPROXIMATELY 565-LF OF THIRTY (30)-FOOT WIDE, TWO (2)-LANE ROADWAY)</b>					
Item No.	Description	Unit	Estimated Quantity	Unit Price	Bid Price
1	Mobilization/Bonds	LS	1	\$	\$
2	Clearing and Grubbing (Right-of-Way)	AC	2.1	\$	\$
3	Earthwork (Excavation/Haul/Backfill/Compaction of Select Fill Import/Soil Amendments) – Unclassified	LS	1	\$	\$
4	Bottomless Culvert System B (94-ft X 50-ft with Footings – Contractor to provide signed and sealed shop drawings for the culvert and footings and certify installation) (Sta: 75+50)	LS	1	\$	\$
5	Segmental Retaining Headwalls/wall (Contractor to provide signed and sealed shop drawings with required backfill and certify installation)	SF	3,500	\$	\$
6	8-inch Graded Aggregate Base Course	SY	2,050	\$	\$
7	4-inch Asphalt Binder Course (Type B)	SY	1,990	\$	\$
8	2-inch Asphalt Surface Course (Type B)	SY	1,990	\$	\$
9	Rip Rap	SY	40	\$	\$
10	Silt Fencing	LF	1,440	\$	\$
11	Inlet Protection	EA	5	\$	\$
12	Drop Inlet	EA	5	\$	\$
13	Emergency Spillway (Sediment Trap(s))	SY	72	\$	\$
14	U-Shaped Rip Rap Berm	EA	4	\$	\$
15	8-inch PVC Pipe (for Sediment Basin Outlet Pipes)	LF	68	\$	\$
16	18-inch RCP	LF	272	\$	\$
17	Erosion Control Slope Matting – Green Armor – Enka Mat or approved equal	SY	4,880	\$	\$
18	Erosion Control Channel Liner – Green Armor – 7520 or approved equal	SY	400	\$	\$
19	Guardrail	LF	412	\$	\$
20	Striping & Signage (To Include Centerline Striping and Edge Striping)	LS	1	\$	\$
21	Grassing	AC	1.5	\$	\$
Division IIA Subtotal:				\$	

Total Bid in Words

\_\_\_\_\_ Dollars \_\_\_\_\_ Cents  
 (\$ \_\_\_\_\_ )

Upon the receipt of the bids, Newberry County shall review the bids received and determine the scope of work for this project based on the available budget for the project. The contract for this project shall be awarded to the low bidder for the project scope as determined by the sum total of the base bid portion or the combined sum of the base bid and approved base bid alternates depending on the scope of the project selected.

The above unit prices shall include all labor, materials, bailing, shoring, removal, overhead, profit, insurance, etc., to complete the finish work as stipulated in the Bid Documents.  
 Unit Prices have been computed in accordance with Paragraph 11.03.B of the General Conditions.

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, determined as provided in the Contract Documents.

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

Phase IIA and III Roadway, Water and Wastewater Improvements Mid-Carolina Commerce Park for Newberry County, South Carolina					
<b>DIVISION IIB – PHASE IIIA ON-SITE WATER IMPROVEMENTS (APPROXIMATELY 565-LF OF 12-INCH WATER MAIN)</b>					
Item No.	Description	Unit	Estimated Quantity	Unit Price	Bid Price
1	Mobilization/Bonds	LS	1	\$	\$
2	12-inch DIP Water Main (Including Fittings / Appurtenances)	LF	565	\$	\$
3	12-inch Gate Valves	EA	3	\$	\$
4	12-inch 45° Bend	EA	4	\$	\$
5	Fire Hydrant Assemblies (Including the Connection to Main Line)	EA	1	\$	\$
Division IIB Subtotal:				\$	

Total Bid in Words

\_\_\_\_\_ Dollars \_\_\_\_\_ Cents  
 (\$ \_\_\_\_\_ )

Upon the receipt of the bids, Newberry County shall review the bids received and determine the scope of work for this project based on the available budget for the project. The contract for this project shall be awarded to the low bidder for the project scope as determined by the sum total of the base bid portion or the combined sum of the base bid and approved base bid alternates depending on the scope of the project selected.

The above unit prices shall include all labor, materials, bailing, shoring, removal, overhead, profit, insurance, etc., to complete the finish work as stipulated in the Bid Documents.

Unit Prices have been computed in accordance with Paragraph 11.03.B of the General Conditions.

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, determined as provided in the Contract Documents.

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

Phase IIA and III Roadway, Water and Wastewater Improvements Mid-Carolina Commerce Park for Newberry County, South Carolina					
<b>DIVISION IIC –PHASE IIIA ON-SITE WASTEWATER IMPROVEMENTS (APPROXIMATELY 600-LF OF 8-INCH WASTEWATER GRAVITY LINE)</b>					
Item No.	Description	Unit	Estimated Quantity	Unit Price	Bid Price
1	Mobilization/Bonds	LS	1	\$	\$
2	8-inch PVC Gravity Main (6-8 Feet Deep)	LF	440	\$	\$
3	8-inch PVC Gravity Main (8-12 Feet Deep)	LF	120	\$	\$
4	8-inch DIP Gravity Main (6-8 Feet Deep)	LF	60	\$	\$
5	Bore and Jack (16-inch Steel Casing)	LF	60	\$	\$
6	4-ft Diameter Wastewater Manholes (6-8 Feet Deep)	EA	2	\$	\$
7	4-ft Diameter Wastewater Manholes (8-12 Feet Deep)	EA	1	\$	\$
8	Rock Excavation	CY	40	\$	\$
9	Connect to Existing Wastewater Gravity System	EA	1	\$	\$
Division IIC Subtotal:				\$	

Total Bid in Words

\_\_\_\_\_ Dollars \_\_\_\_\_ Cents  
 (\$ \_\_\_\_\_ )

Upon the receipt of the bids, Newberry County shall review the bids received and determine the scope of work for this project based on the available budget for the project. The contract for this project shall be awarded to the low bidder for the project scope as determined by the sum total of the base bid portion or the combined sum of the base bid and approved base bid alternates depending on the scope of the project selected.

The above unit prices shall include all labor, materials, bailing, shoring, removal, overhead, profit, insurance, etc., to complete the finish work as stipulated in the Bid Documents.

Unit Prices have been computed in accordance with Paragraph 11.03.B of the General Conditions.

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, determined as provided in the Contract Documents.

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

Phase IIA and III Roadway, Water and Wastewater Improvements Mid-Carolina Commerce Park for Newberry County, South Carolina					
<b>DIVISION IIIA – PHASE IIIB ROADWAY IMPROVEMENTS (STA: 60+00 TO 74+00) (APPROXIMATELY 1,400-LF OF THIRTY (30)-FOOT WIDE, TWO (2)-LANE ROADWAY)</b>					
Item No.	Description	Unit	Estimated Quantity	Unit Price	Bid Price
1	Mobilization/Bonds	LS	1	\$	\$
2	Clearing and Grubbing (Right-of-Way)	AC	7	\$	\$
3	Earthwork (Excavation/Haul/Backfill/Compaction of Select Fill Import/Soil Amendments) – Unclassified	LS	1	\$	\$
4	Bottomless Culvert System A (90-ft X 48-ft with Footings – Contractor to provide signed and sealed shop drawings for the culvert and footings and certify installation) (Sta: 62+00)	LS	1	\$	\$
5	Segmental Retaining Headwalls/Wall (Contractor to provide signed and sealed shop drawings with required backfill and certify installation)	SF	1,750	\$	\$
6	4-inch Graded Aggregate Base Course	SY	960	\$	\$
7	8-inch Graded Aggregate Base Course	SY	4,830	\$	\$
8	4-inch Asphalt Binder Course (Type B)	SY	4,667	\$	\$
9	2-inch Asphalt Surface Course (Type B)	SY	4,667	\$	\$
10	Rip Rap	SY	20	\$	\$
11	Silt Fencing	LF	1,000	\$	\$
12	Inlet Protection	EA	2	\$	\$
13	Drop Inlet	EA	2	\$	\$
14	Emergency Spillway (Sediment Trap(s))	SY	45	\$	\$
15	U-Shaped Rip Rap Berm	EA	1	\$	\$
16	8-inch PVC Pipe (for Sediment Basin Outlet Pipes)	LF	40	\$	\$
17	24-inch RCP	LF	128	\$	\$
18	Erosion Control Slope Matting – Green Armor – Enka Mat or approved equal	SY	6,700	\$	\$
19	Erosion Control Channel Liner – Green Armor – 7520 or approved equal	SY	2,215	\$	\$
20	Guardrail	LF	425	\$	\$
21	Striping & Signage (To Include Centerline Striping and Edge Striping per SCDOT - “Road Ends” Barricade/Signage)	LS	1	\$	\$
22	Grassing	AC	6	\$	\$
Division IIIA Subtotal:				\$	

Total Bid in Words

\_\_\_\_\_ Dollars \_\_\_\_\_ Cents  
 (\$ \_\_\_\_\_ )

Upon the receipt of the bids, Newberry County shall review the bids received and determine the scope of work for this project based on the available budget for the project. The contract for this project shall be awarded to the low

bidder for the project scope as determined by the sum total of the base bid portion or the combined sum of the base bid and approved base bid alternates depending on the scope of the project selected.

The above unit prices shall include all labor, materials, bailing, shoring, removal, overhead, profit, insurance, etc., to complete the finish work as stipulated in the Bid Documents.

Unit Prices have been computed in accordance with Paragraph 11.03.B of the General Conditions.

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, determined as provided in the Contract Documents.

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

Phase IIA and III Roadway, Water and Wastewater Improvements Mid-Carolina Commerce Park for Newberry County, South Carolina					
<b>DIVISION IIIB – PHASE IIIB ON-SITE WATER IMPROVEMENTS (APPROXIMATELY 1,400-LF OF 12-INCH WATER MAIN)</b>					
Item No.	Description	Unit	Estimated Quantity	Unit Price	Bid Price
1	Mobilization/Bonds	LS	1	\$	\$
2	12-inch DIP Water Main (Including Fittings / Appurtenances)	LF	1,400	\$	\$
3	12-inch Gate Valves	EA	4	\$	\$
4	12-inch Plug	EA	1	\$	\$
5	Air Relief Valve with Manhole Structure	EA	1	\$	\$
6	Fire Hydrant Assemblies (Including the Connection to Main Line)	EA	2	\$	\$
Division IIIB Subtotal:				\$	

Total Bid in Words

\_\_\_\_\_ Dollars \_\_\_\_\_ Cents  
 (\$ \_\_\_\_\_ )

Upon the receipt of the bids, Newberry County shall review the bids received and determine the scope of work for this project based on the available budget for the project. The contract for this project shall be awarded to the low bidder for the project scope as determined by the sum total of the base bid portion or the combined sum of the base bid and approved base bid alternates depending on the scope of the project selected.

The above unit prices shall include all labor, materials, bailing, shoring, removal, overhead, profit, insurance, etc., to complete the finish work as stipulated in the Bid Documents.

Unit Prices have been computed in accordance with Paragraph 11.03.B of the General Conditions.

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, determined as provided in the Contract Documents.

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

Phase IIA and III Roadway, Water and Wastewater Improvements Mid-Carolina Commerce Park for Newberry County, South Carolina					
<b>DIVISION IIIC – PHASE IIIB ON-SITE WASTEWATER IMPROVEMENTS (APPROXIMATELY 675-LF OF 8-INCH WASTEWATER GRAVITY LINE)</b>					
Item No.	Description	Unit	Estimated Quantity	Unit Price	Bid Price
1	Mobilization/Bonds	LS	1	\$	\$
2	8-inch PVC Gravity Main (6-8 Feet Deep)	LF	125	\$	\$
3	8-inch PVC Gravity Main (8-12 Feet Deep)	LF	25	\$	\$
4	8-inch PVC Gravity Main (12-16 Feet Deep)	LF	50	\$	\$
5	8-inch DIP Gravity Main (6-8 Feet Deep)	LF	475	\$	\$
6	Bore and Jack (16-inch Steel Casing)	LF	120	\$	\$
7	4-ft Diameter Wastewater Manholes (6-8 Feet Deep)	EA	3	\$	\$
8	4-ft Diameter Wastewater Manholes (8-12 Feet Deep)	EA	1	\$	\$
9	4-ft Diameter Wastewater Manholes (12-16 Feet Deep)	EA	1	\$	\$
10	Rock Excavation	CY	40	\$	\$
11	Connect to Existing Wastewater Gravity System	EA	1	\$	\$
Division IIIC Subtotal:				\$	

Total Bid in Words

\_\_\_\_\_ Dollars \_\_\_\_\_ Cents  
 (\$ \_\_\_\_\_ )

Upon the receipt of the bids, Newberry County shall review the bids received and determine the scope of work for this project based on the available budget for the project. The contract for this project shall be awarded to the low bidder for the project scope as determined by the sum total of the base bid portion or the combined sum of the base bid and approved base bid alternates depending on the scope of the project selected.

The above unit prices shall include all labor, materials, bailing, shoring, removal, overhead, profit, insurance, etc., to complete the finish work as stipulated in the Bid Documents.

Unit Prices have been computed in accordance with Paragraph 11.03.B of the General Conditions.

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, determined as provided in the Contract Documents.



5.09 Base Bid Alternate No. 1 - Bidder will complete the Work in accordance with the Contract Documents for the following unit price(s):

Base Bid – Alternate No. 1A					
Phase IIA and III Roadway, Water and Wastewater Improvements Mid-Carolina Commerce Park for Newberry County, South Carolina					
PHASE IIIB ROADWAY IMPROVEMENTS (STA: 49+00 TO 60+00) (APPROXIMATELY 1,100-LF OF THIRTY (30)-FOOT WIDE, TWO (2)-LANE ROADWAY)					
Item No.	Description	Unit	Estimated Quantity	Unit Price	Bid Price
1	Mobilization/Bonds	LS	1	\$	\$
2	Clearing and Grubbing (Right-of-Way)	AC	5.5	\$	\$
3	Earthwork (Excavation/Haul/Backfill/Compaction of Select Fill Import/Soil Amendments) – Unclassified	LS	1	\$	\$
4	8-inch Graded Aggregate Base Course	SY	4,130	\$	\$
5	4-inch Asphalt Binder Course (Type B)	SY	4,000	\$	\$
6	2-inch Asphalt Surface Course (Type B)	SY	4,000	\$	\$
7	Rip Rap	SY	15	\$	\$
8	Silt Fencing	LF	2,665	\$	\$
9	Emergency Spillway (Sediment Trap(s))	SY	35	\$	\$
10	U-Shaped Rip Rap Berm	EA	1	\$	\$
11	8-inch PVC Pipe (for Sediment Basin Outlet Pipes)	LF	32	\$	\$
12	Erosion Control Slope Matting – Green Armor – Enka Mat or approved equal	SY	1,400	\$	\$
13	Erosion Control Channel Liner – Green Armor – 7520 or approved equal	SY	1,760	\$	\$
14	Striping & Signage (To Include Centerline Striping and Edge Striping per SCDOT)	LS	1	\$	\$
15	Grassing	AC	4.7	\$	\$
Base Bid – Alternate No. 1A Subtotal:				\$	

Total Bid in Words

\_\_\_\_\_ Dollars \_\_\_\_\_ Cents

(\$ \_\_\_\_\_ )

Upon the receipt of the bids, Newberry County shall review the bids received and determine the scope of work for this project based on the available budget for the project. The contract for this project shall be awarded to the low bidder for the project scope as determined by the sum total of the base bid portion or the combined sum of the base bid and approved base bid alternates depending on the scope of the project selected.

The above unit prices shall include all labor, materials, bailing, shoring, removal, overhead, profit, insurance, etc., to complete the finish work as stipulated in the Bid Documents.

Unit Prices have been computed in accordance with Paragraph 11.03.B of the General Conditions.

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, determined as provided in the Contract Documents.

5.10 Base Bid Alternate No. 1 - Bidder will complete the Work in accordance with the Contract Documents for the following unit price(s):

Base Bid – Alternate No. 1B					
Phase IIA and III Roadway, Water and Wastewater Improvements Mid-Carolina Commerce Park for Newberry County, South Carolina					
PHASE IIIB ON-SITE WATER IMPROVEMENTS (APPROXIMATELY 1,100-LF OF 12-INCH WATER MAIN)					
Item No.	Description	Unit	Estimated Quantity	Unit Price	Bid Price
1	Mobilization/Bonds	LS	1	\$	\$
2	12-inch DIP Water Main (Including Fittings / Appurtenances)	LF	1,100	\$	\$
3	12-inch Gate Valves	EA	1	\$	\$
4	Fire Hydrant Assemblies (Including the Connection to Main Line)	EA	2	\$	\$
Base Bid – Alternate No. 1B Subtotal:				\$	

Total Bid in Words

\_\_\_\_\_ Dollars \_\_\_\_\_ Cents  
 (\$ \_\_\_\_\_ )

Upon the receipt of the bids, Newberry County shall review the bids received and determine the scope of work for this project based on the available budget for the project. The contract for this project shall be awarded to the low bidder for the project scope as determined by the sum total of the base bid portion or the combined sum of the base bid and approved base bid alternates depending on the scope of the project selected.

The above unit prices shall include all labor, materials, bailing, shoring, removal, overhead, profit, insurance, etc., to complete the finish work as stipulated in the Bid Documents.

Unit Prices have been computed in accordance with Paragraph 11.03.B of the General Conditions.

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, determined as provided in the Contract Documents.

**SUMMARY**

**BASE BID**

- **DIVISION I – PHASE IIA IMPROVEMENTS**

DIVISION IA – PHASE IIA ROADWAY SUBTOTAL \$ \_\_\_\_\_

DIVISION IB – PHASE IIA ON-SITE WATER SUBTOTAL \$ \_\_\_\_\_

- **DIVISION II – PHASE IIIA IMPROVEMENTS**

DIVISION IIA – PHASE IIIA ROADWAY SUBTOTAL \$ \_\_\_\_\_

DIVISION IIB – PHASE IIIA ON-SITE WATER SUBTOTAL \$ \_\_\_\_\_

DIVISION IIC – PHASE IIIA ON-SITE WASTEWATER SUBTOTAL \$ \_\_\_\_\_

- **DIVISION III – PHASE IIIB IMPROVEMENTS**

DIVISION IIIA – PHASE IIIB ROADWAY (STA: 60+00 – 74+00) SUBTOTAL \$ \_\_\_\_\_

DIVISION IIIB – PHASE IIIB ON-SITE WATER SUBTOTAL \$ \_\_\_\_\_

DIVISION IIIC – PHASE IIIB ON-SITE WASTEWATER SUBTOTAL \$ \_\_\_\_\_

**TOTAL BASE BID** \$ \_\_\_\_\_

Total Base Bid in Words

\_\_\_\_\_ Dollars \_\_\_\_\_ Cents

(\$ \_\_\_\_\_)

Amounts are to be shown in both words and figures. In case of discrepancy, the amount shown in words will govern.

The Base Bid amount is the total amount Bid and the Bidder acknowledges that the Project will be awarded based on the Total Base Bid Amount, and included Divisions I, II, and III.

**BASE BID – ALTERNATE NO. 1 (REMAINING PORTION OF PHASE IIIB IMPROVEMENTS)**

ALT. NO. IA – PHASE IIIB ROADWAY (STA: 49+00 – 60+00) SUBTOTAL \$ \_\_\_\_\_

ALT. NO. IB – PHASE IIIB ON-SITE WATER SUBTOTAL \$ \_\_\_\_\_

**TOTAL BASE BID – ALTERNATE NO. 1** \$ \_\_\_\_\_

Total Base Bid – Alternate No. 1 in Words

\_\_\_\_\_ Dollars \_\_\_\_\_ Cents

(\$ \_\_\_\_\_)

Amounts are to be shown in both words and figures. In case of discrepancy, the amount shown in words will govern.

**ARTICLE 6 - TIME OF COMPLETION**

6.01 Bidder agrees that the Work: Phase IIA and III Roadway, Water and Wastewater Improvements Mid-Carolina Commerce Park for Newberry County, South Carolina is to be completed within two hundred and seventy (270) days after the Notice to Proceed has been issued.

6.02 Bidder accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work within the Contract dates in the amount of \$1,000 per day for each calendar day required to complete the work in the manner and within the dates as stated in Paragraph 6.01 above.

**ARTICLE 7 - ATTACHMENTS TO THIS BID**

7.01 The following documents are attached to and made a condition of this Bid:

- A. Required Bid security in the form of five percent (5%) of the total bid amount.
- B. Power of Attorney.

**ARTICLE 8 - DEFINED TERMS**

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

**ARTICLE 9 - BID SUBMITTAL**

9.01 This Bid submitted by:

An Individual

Name (typed or printed): \_\_\_\_\_  
 By: \_\_\_\_\_ (SEAL)  
 (Individual's signature)  
 Title: \_\_\_\_\_  
 Doing business as: \_\_\_\_\_

A Partnership

Partnership Name: \_\_\_\_\_ (SEAL)  
 By: \_\_\_\_\_  
 (Signature of general partner -- attach evidence of authority to sign)  
 Title: \_\_\_\_\_  
 Name (typed or printed): \_\_\_\_\_

A Corporation

Corporation Name: \_\_\_\_\_ (SEAL)  
 State of Incorporation: \_\_\_\_\_  
 Type (General Business, Professional, Service, Limited Liability): \_\_\_\_\_  
 By: \_\_\_\_\_  
 (Signature -- attach evidence of authority to sign)  
 Name (typed or printed): \_\_\_\_\_  
 Title: \_\_\_\_\_ (CORPORATE SEAL)  
 Attest \_\_\_\_\_  
 Date of Authorization to do business in [South Carolina] is     /     /     .

A Joint Venture

Name of Joint Venture: \_\_\_\_\_  
First Joint Venturer Name: \_\_\_\_\_ (SEAL)

By: \_\_\_\_\_  
(Signature of first joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): \_\_\_\_\_  
Title: \_\_\_\_\_

Second Joint Venturer Name: \_\_\_\_\_ (SEAL)  
By: \_\_\_\_\_

(Signature of second joint venture partner -- attach evidence of authority to sign)  
Name (typed or printed): \_\_\_\_\_

Title: \_\_\_\_\_

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

Bidder's Business Address \_\_\_\_\_

Telephone No. \_\_\_\_\_ Fax No. \_\_\_\_\_

SUBMITTED on \_\_\_\_\_, 2021. State Contractor License No. \_\_\_\_\_.

**SECTION 00 43 00**

**BID BOND**

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

BIDDER (Name and Address):

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

OWNER (Name and Address): **Newberry County  
Post Office Box 156 (Mailing)  
1309 College Street (Physical)  
Newberry, South Carolina, 29108**

BID

Bid Due Date: \_\_\_\_\_

Project (Brief Description Including Location): **Phase IIA and III Roadway, Water and Wastewater  
Improvements Mid-Carolina Commerce Park for  
Newberry County, South Carolina**

BOND

Bond Number:

Date (Not later than Bid due date):

Penal sum \_\_\_\_\_ (Words) \_\_\_\_\_ (Figures)

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)

\_\_\_\_\_  
Surety's Name and Corporate Seal (Seal)

By: \_\_\_\_\_  
Signature and Title

By: \_\_\_\_\_  
Signature and Title  
(Attach Power of Attorney)

Attest: \_\_\_\_\_  
Signature and Title

Attest: \_\_\_\_\_  
Signature and Title

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

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Surety's liability.
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 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
7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

above is received by Bidder and Surety and in no case later than one year after Bid due date.

**SECTION 00 45 13**

**CONTRACTOR/SUBCONTRACTOR QUALIFICATIONS**

**PART 1 - GENERAL**

**1.01 The following information and completed forms may be requested by the Owner of the three lowest bidders. The request will be made the day of the Bid Opening or within five (5) days following the Bid Opening. If requested, this data must be submitted to the Engineer or Owner within ten (10) days of the request. Failure to provide the data in this section, upon request, will subject bidder to disqualification.**

**1.02 DESCRIPTION**

- A. Information provided will be used by the Engineer or Owner to determine the competency and ability of the Contractor and/or Subcontractor to perform the scheduled work in a manner that is satisfactory to the Engineer or Owner. The Engineer or Owner's decision shall be final.
- B. Any Subcontractor being used by the General Contractor, whose portion of the project exceeds 5% of the total bid price amount, will be required to provide the same information as the General Contractor.
- C. The Contractor and Subcontractor shall include with this section a detailed financial statement indicating the Contractor's or Subcontractor's financial resources. The information on that statement shall be certified by a Certified Public Accountant and shall be submitted on the Associated General Contractor's of America form "Standard Questionnaires and Financial Statement for Bidders".
- D. The Contractor and Subcontractor shall certify by attaching his signature to this Section as provided that all information contained herein is complete and all statements and answers are accurate and true. Providing misinformation, incomplete information, inaccurate information, or failure to certify the information, will subject bidder to disqualification.

**1.03 QUALIFICATIONS**

- A. Complete the following for General Contractor and any Subcontractors (attach additional sheets as required):
  - 1. Name: \_\_\_\_\_
  - 2. Address: \_\_\_\_\_
  - 3. City, State, Zip: \_\_\_\_\_
  - 4. Principle: \_\_\_\_\_
- B. Number of years the company has been in business: \_\_\_\_\_
- C. List and describe at least five (5) projects that have been completed, that are similar in size and type, and that has been completed within the last ten (10) years:
  - 1. \_\_\_\_\_  
\_\_\_\_\_
  - 2. \_\_\_\_\_  
\_\_\_\_\_



- 3. \_\_\_\_\_  
\_\_\_\_\_
- 4. \_\_\_\_\_  
\_\_\_\_\_
- 5. \_\_\_\_\_  
\_\_\_\_\_

D. For the projects listed above provide the following:

- 1. Project Owner: \_\_\_\_\_  
 Contact Name and Title: \_\_\_\_\_  
 Telephone Number: \_\_\_\_\_
- 2. Project Owner: \_\_\_\_\_  
 Contact Name and Title: \_\_\_\_\_  
 Telephone Number: \_\_\_\_\_
- 3. Project Owner: \_\_\_\_\_  
 Contact Name and Title: \_\_\_\_\_  
 Telephone Number: \_\_\_\_\_
- 4. Project Owner: \_\_\_\_\_  
 Contact Name and Title: \_\_\_\_\_  
 Telephone Number: \_\_\_\_\_
- 5. Project Owner: \_\_\_\_\_  
 Contact Name and Title: \_\_\_\_\_  
 Telephone Number: \_\_\_\_\_

E. For each of the projects listed in Items C & D provide the following:

- 1. Original Bid Amount: \_\_\_\_\_  
 Final Construction Cost: \_\_\_\_\_  
 Contract Period: \_\_\_\_\_  
 Actual Contract Period: \_\_\_\_\_  
 Explanation: \_\_\_\_\_

2. Original Bid Amount: \_\_\_\_\_  
 Final Construction Cost: \_\_\_\_\_  
 Contract Period: \_\_\_\_\_  
 Actual Contract Period: \_\_\_\_\_  
 Explanation: \_\_\_\_\_
  
3. Original Bid Amount: \_\_\_\_\_  
 Final Construction Cost: \_\_\_\_\_  
 Contract Period: \_\_\_\_\_  
 Actual Contract Period: \_\_\_\_\_  
 Explanation: \_\_\_\_\_
  
4. Original Bid Amount: \_\_\_\_\_  
 Final Construction Cost: \_\_\_\_\_  
 Contract Period: \_\_\_\_\_  
 Actual Contract Period: \_\_\_\_\_  
 Explanation: \_\_\_\_\_
  
5. Original Bid Amount: \_\_\_\_\_  
 Final Construction Cost: \_\_\_\_\_  
 Contract Period: \_\_\_\_\_  
 Actual Contract Period: \_\_\_\_\_  
 Explanation: \_\_\_\_\_

F. Provide the following for any portion of the work that is being subcontracted (5% or more of the Bid Amount):

1. Name of Subcontractor: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 Telephone Number: \_\_\_\_\_  
 Work being Completed: \_\_\_\_\_
  
2. Name of Subcontractor: \_\_\_\_\_  
 Address City/State/Zip: \_\_\_\_\_  
 Telephone Number: \_\_\_\_\_  
 Work being Completed: \_\_\_\_\_

3. Name of Subcontractor: \_\_\_\_\_  
 Address City/State/Zip: \_\_\_\_\_  
 Telephone Number: \_\_\_\_\_  
 Work being Completed: \_\_\_\_\_
  
4. Name of Subcontractor: \_\_\_\_\_  
 Address City/State/Zip: \_\_\_\_\_  
 Telephone Number: \_\_\_\_\_  
 Work being Completed: \_\_\_\_\_
  
5. Name of Subcontractor: \_\_\_\_\_  
 Address City/State/Zip: \_\_\_\_\_  
 Telephone Number: \_\_\_\_\_  
 Work being Completed: \_\_\_\_\_

G. Provide a list of equipment that is owned by the Contractor and is available for this project.

\_\_\_\_\_  
 \_\_\_\_\_

H. Provide a list of equipment that will be purchased, leased or rented for this project.

\_\_\_\_\_  
 \_\_\_\_\_

I. Provide a list of the superintendent(s) or others that will be in charge of this project (Provide resumes and qualifications):

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

J. Provide the following for current projects being completed:

1. Project Name: \_\_\_\_\_  
 Owner: \_\_\_\_\_  
 Current Status: \_\_\_\_\_  
 Estimated Schedule of Completion: \_\_\_\_\_
  
2. Project Name: \_\_\_\_\_  
 Owner: \_\_\_\_\_  
 Current Status: \_\_\_\_\_  
 Estimated Schedule of Completion: \_\_\_\_\_

3. Project Name: \_\_\_\_\_  
Owner: \_\_\_\_\_  
Current Status: \_\_\_\_\_  
Estimated Schedule of Completion: \_\_\_\_\_

4. Project Name: \_\_\_\_\_  
Owner: \_\_\_\_\_  
Current Status: \_\_\_\_\_  
Estimated Schedule of Completion: \_\_\_\_\_

5. Project Name: \_\_\_\_\_  
Owner: \_\_\_\_\_  
Current Status: \_\_\_\_\_  
Estimated Schedule of Completion: \_\_\_\_\_

K. Provide a list of projects that has been completed with the Owner over the past fifteen (15) years:

1. Project Name: \_\_\_\_\_  
Contact Name and Title: \_\_\_\_\_  
Telephone Number: \_\_\_\_\_

2. Project Name: \_\_\_\_\_  
Contact Name and Title: \_\_\_\_\_  
Telephone Number: \_\_\_\_\_

3. Project Name: \_\_\_\_\_  
Contact Name and Title: \_\_\_\_\_  
Telephone Number: \_\_\_\_\_

4. Project Name: \_\_\_\_\_  
Contact Name and Title: \_\_\_\_\_  
Telephone Number: \_\_\_\_\_

5. Project Name: \_\_\_\_\_  
Contact Name and Title: \_\_\_\_\_  
Telephone Number: \_\_\_\_\_

L. Provide a list of projects that Bid with the Owner over the past fifteen (15) years:

1. Project Name: \_\_\_\_\_  
Contact Name and Title: \_\_\_\_\_  
Telephone Number: \_\_\_\_\_
  
2. Project Name: \_\_\_\_\_  
Contact Name and Title: \_\_\_\_\_  
Telephone Number: \_\_\_\_\_
  
3. Project Name: \_\_\_\_\_  
Contact Name and Title: \_\_\_\_\_  
Telephone Number: \_\_\_\_\_
  
4. Project Name: \_\_\_\_\_  
Contact Name and Title: \_\_\_\_\_  
Telephone Number: \_\_\_\_\_
  
5. Project Name: \_\_\_\_\_  
Contact Name and Title: \_\_\_\_\_  
Telephone Number: \_\_\_\_\_

M. Provide a list of projects completed with the Engineer over the past fifteen (15) years:

1. Project Name: \_\_\_\_\_  
Project Engineer: \_\_\_\_\_  
Original Bid Amount: \_\_\_\_\_  
Final Construction Cost: \_\_\_\_\_  
Contract Period: \_\_\_\_\_  
Actual Contract Period: \_\_\_\_\_  
Explanation: \_\_\_\_\_
  
2. Project Name: \_\_\_\_\_  
Project Engineer: \_\_\_\_\_  
Original Bid Amount: \_\_\_\_\_  
Final Construction Cost: \_\_\_\_\_  
Contract Period: \_\_\_\_\_  
Actual Contract Period: \_\_\_\_\_  
Explanation: \_\_\_\_\_

3. Project Name: \_\_\_\_\_  
 Project Engineer: \_\_\_\_\_  
 Original Bid Amount: \_\_\_\_\_  
 Final Construction Cost: \_\_\_\_\_  
 Contract Period: \_\_\_\_\_  
 Actual Contract Period: \_\_\_\_\_  
 Explanation: \_\_\_\_\_
  
4. Project Name: \_\_\_\_\_  
 Project Engineer: \_\_\_\_\_  
 Original Bid Amount: \_\_\_\_\_  
 Final Construction Cost: \_\_\_\_\_  
 Contract Period: \_\_\_\_\_  
 Actual Contract Period: \_\_\_\_\_  
 Explanation: \_\_\_\_\_
  
5. Project Name: \_\_\_\_\_  
 Project Engineer: \_\_\_\_\_  
 Original Bid Amount: \_\_\_\_\_  
 Final Construction Cost: \_\_\_\_\_  
 Contract Period: \_\_\_\_\_  
 Actual Contract Period: \_\_\_\_\_  
 Explanation: \_\_\_\_\_

N. Provide a list of projects involved with litigation, arbitration and/or mediation over the past twenty (20) years:

1. Project Name: \_\_\_\_\_  
 Project Owner: \_\_\_\_\_  
 Project Engineer: \_\_\_\_\_  
 Date: \_\_\_\_\_  
 Explanation: \_\_\_\_\_
  
2. Project Name: \_\_\_\_\_  
 Project Owner: \_\_\_\_\_  
 Project Engineer: \_\_\_\_\_  
 Date: \_\_\_\_\_  
 Explanation: \_\_\_\_\_



1.04 I HEREBY CERTIFY that as a duly authorized representative of \_\_\_\_\_  
\_\_\_\_\_(bidder), the information  
provided is to the best of my knowledge accurate and that failure to provide accurate information  
will result in disqualification of my bid.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Name (Please Print)

\_\_\_\_\_  
Title

\_\_\_\_\_  
Date

\_\_\_\_\_  
Notary Public for South Carolina

My Commission Expires: \_\_\_\_\_

**PART 2 - PRODUCTS - NOT USED**

**PART 3 - EXECUTION - NOT USED**

**END OF SECTION**





SECTION 00 51 02

NOTICE OF AWARD

Project: <b>Phase IIA and III Roadway, Water and Wastewater Improvements Mid-Carolina Commerce Park for Newberry County, South Carolina</b>		Owner: <b>Newberry County</b>	Dated _____
Contract: <b>Phase IIA and III Roadway, Water and Wastewater Improvements Mid-Carolina Commerce Park for Newberry County, South Carolina</b>		Owner's Contract No.: <b>2021-11</b>	Engineer's Project No.: <b>17113-0036</b>
Bidder: _____			
Bidder's Address: (send Certified Mail, Return Receipt Requested): _____			

You are notified that your Bid dated \_\_\_\_\_ for the above Contract has been considered. You are the Successful Bidder and are awarded a Contract for **Phase IIA and III Roadway, Water and Wastewater Improvements Mid-Carolina Commerce Park for Newberry County, South Carolina**

The Contract Price of your Contract is: \_\_\_\_\_

\_\_\_ copies of each of the proposed Contract Documents (except Drawings) accompany this Notice of Award.

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

You must comply with the following conditions precedent within seven (7) days of the date you receive this Notice of Award.

1. Deliver to the Owner three (3) fully executed counterparts of the Contract Documents.
2. Deliver with the executed Contract Documents the Contract security [Bonds] as specified in the Instructions to Bidders (Article 20), [and] General Conditions (Paragraph 5.01).

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

Within seven (7) days after you comply with the above conditions, Owner will return to you one (1) fully executed counterpart of the Contract Documents.

\_\_\_\_\_  
**Newberry County**  
 Owner

By: \_\_\_\_\_  
 Authorized Signature

\_\_\_\_\_  
 Title

**Acceptance of Notice**

Receipt of the above Notice of Award is hereby acknowledged by \_\_\_\_\_  
This the \_\_\_\_\_ day of \_\_\_\_\_, 2021.

\_\_\_\_\_  
 Contractor

By: \_\_\_\_\_  
 Authorized Signature

\_\_\_\_\_  
 Title

Copy to Engineer

SECTION 00 52 00

CONTRACT

THIS AGREEMENT is by and between Newberry County

(hereinafter called "Owner") and \_\_\_\_\_ (hereinafter called "Contractor")

doing business as an **individual/a partnership/a corporation/a joint venture** (strike out inapplicable terms), with its primary office in \_\_\_\_\_, County of \_\_\_\_\_, State of **South Carolina**.

Owner and Contractor, in consideration of the mutual covenants set forth herein, 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: **Phase IIA and III Roadway, Water and Wastewater Improvements Mid-Carolina Commerce Park for Newberry County, South 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: **Phase IIA and III Roadway, Water and Wastewater Improvements Mid-Carolina Commerce Park for Newberry County, South Carolina**

**ARTICLE 3 - ENGINEER**

3.01 The Project has been designed by: Alliance Consulting Engineers, Inc., 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 for final payment as stated in the Contract Documents are of the essence of the Contract.

4.02 Dates for Substantial Completion and Final Payment

A. **The Phase IIA and III Roadway, Water and Wastewater Improvements Mid-Carolina Commerce Park for Newberry County, South Carolina is to be completed within two hundred and seventy (270) days after the Notice to Proceed has been issued. Issuance of the Notice to Proceed shall be issued after the Notice of Intent to Award has been issued and the ten (10) day protest period has passed County Council.**

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 times 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 \$1,500 for each day that expires after the time specified in Paragraph 4.02 for

completion and readiness for final payment until the Work is completed and ready for final payment.

## ARTICLE 5 - CONTRACT PRICE

- 5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the amounts determined pursuant to Paragraphs 5.01.A below:
- A. For all Unit Price Work, an amount equal to the sum of the established unit price for each separately identified item of Unit Price Work times the estimated quantity of that item as indicated in the Bid Form attached hereto as part of these Contract Documents.

## 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 15th day of 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 as provided in Paragraph 2.07.A of the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the General Requirements:
1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Engineer may determine or Owner may withhold, including but not limited to liquidated damages, in accordance with Paragraph 14.02 of the General Conditions:
    - a. **90%** of Work completed (with the balance being Retainage). If the Work has been 50% completed as determined by Engineer, and if the character and progress of the Work have been satisfactory to Owner and Engineer, Owner, on recommendation of Engineer, may determine that as long as the character and progress of the Work remain satisfactory to them, there will be no additional Retainage.
    - b. **90%** of cost of materials and equipment not incorporated in the Work (with the balance being Retainage).
  2. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to **95%** of the Work completed, less such amounts as Engineer shall determine in accordance with Paragraph 14.02.B.5 of the General Conditions and less **5%** of Engineer's estimate of the value of Work to be completed or corrected as shown on the tentative list of items to be completed or corrected attached to the certificate of Substantial Completion.
- 6.03 Final Payment
- A. Upon final completion and acceptance of the Work in accordance with Paragraph 14.07 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 14.07.

## ARTICLE 7 - INTEREST

7.01 All moneys not paid when due as provided in Article 14 of the General Conditions shall bear interest at the rate of 1-1/2% 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 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 Paragraph 4.06 of the General Conditions.
  - E. Contractor has obtained and carefully studied (or assumes responsibility for doing so) all 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 any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents, 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 that relates 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 (Section 00 52 00).
  - 2. Performance Bond (Section 00 61 13.13).
  - 3. Payment Bond (Section 00 61 13.16).
  - 4. General Conditions (Section 00 70 00).
  - 5. Contractor/Subcontract Qualifications (Section 00 45 13)
  - 6. Drawings Index (Section 00 01 15)
  - 7. Exhibits to this Agreement (enumerated as follows):
    - a. Contractor's Bid (Section 00 41 00)
  - 8. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:
    - a. Notice to Proceed (Section 00 55 00).
    - b. Work Change Directives as issued (Section 00 63 49)
    - c. Change Order(s) as issued (Section 00 63 63)
- B. The documents listed in Paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in this Article 9.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in Paragraph 3.04 of the General Conditions.

## **ARTICLE 10 - MISCELLANEOUS**

### 10.01 Terms

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

### 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.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement. One counterpart each has been delivered to Owner, Contractor, Engineer and provided to the Contractor for his Bonding Agency. All portions of the Contract Documents have been signed or identified by Owner and Contractor or on their behalf.

This Agreement will be effective on this \_\_\_\_\_ day of \_\_\_\_\_, 2021 (which is the Effective Date of the Agreement).

OWNER:

CONTRACTOR:

\_\_\_\_\_ **Newberry County**

\_\_\_\_\_

By: \_\_\_\_\_

By: \_\_\_\_\_

Title: \_\_\_\_\_

Title: \_\_\_\_\_

[CORPORATE SEAL]

[CORPORATE SEAL]

Attest: \_\_\_\_\_

Attest: \_\_\_\_\_

Title: \_\_\_\_\_

Title: \_\_\_\_\_

Address for giving notices:

Address for giving notices:

\_\_\_\_\_ **Newberry County**

\_\_\_\_\_

\_\_\_\_\_ **Post Office Box 156 (Mailing)**  
\_\_\_\_\_ **1309 College Street (Physical)**  
\_\_\_\_\_ **Newberry, South Carolina 29108**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_

License No.: \_\_\_\_\_  
(Where applicable)

Agent for service or  
process: \_\_\_\_\_





**SECTION 00 61 13.13**

**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): **Newberry County  
Post Office Box 156 (Mailing)  
1309 College Street (Physical)  
Newberry, South Carolina 29108**

**CONTRACT**

Date:

Amount:

Description (Name and Location): **Phase IIA and III Roadway, Water and Wastewater Improvements Mid-Carolina Commerce Park for Newberry County, South Carolina**

**BOND**

Bond Number:

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**

Company:

Signature: \_\_\_\_\_ (Seal)

Name and Title:

**SURETY**

\_\_\_\_\_  
(Seal)

Surety's Name and Corporate Seal

By: \_\_\_\_\_

Signature and Title

(Attach Power of Attorney)

(Space is provided below for signatures of additional parties, if required.)

Attest: \_\_\_\_\_

Signature and Title

**CONTRACTOR AS PRINCIPAL**

Company:

Signature: \_\_\_\_\_ (Seal)

Name and Title:

**SURETY**

\_\_\_\_\_  
(Seal)

Surety's Name and Corporate Seal

By: \_\_\_\_\_

Signature and Title

(Attach Power of Attorney)

Attest: \_\_\_\_\_

Signature and Title:

1. Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to Owner for the performance of the Contract, which is incorporated herein by reference.
2. If Contractor performs the Contract, Surety and 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, Surety's obligation under this Bond shall arise after:
  - 3.1. Owner has notified Contractor and Surety, at the addresses described in Paragraph 10 below, that Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with Contractor and Surety to be held not later than 15 days after receipt of such notice to discuss methods of performing the Contract. If Owner, Contractor and Surety agree, Contractor shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive Owner's right, if any, subsequently to declare a Contractor Default; and
  - 3.2. Owner has declared a Contractor Default and formally terminated Contractor's right to complete the Contract. Such Contractor Default shall not be declared earlier than 20 days after Contractor and Surety have received notice as provided in Paragraph 3.1; and
  - 3.3. Owner has agreed to pay the Balance of the Contract Price to:
    1. Surety in accordance with the terms of the Contract;
    2. Another contractor selected pursuant to Paragraph 4.3 to perform the Contract.
4. When Owner has satisfied the conditions of Paragraph 3, Surety shall promptly and at Surety's expense take one of the following actions:
  - 4.1. Arrange for Contractor, with consent of Owner, to 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 Owner for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by Owner and Contractor selected with 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 Owner the amount of damages as described in Paragraph 6 in excess of the Balance of the Contract Price incurred by Owner resulting from Contractor Default; or
  - 4.4. Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:
    1. After investigation, determine the amount for which it may be liable to Owner and, as soon as practicable after the amount is determined, tender payment therefor to Owner; or
    2. Deny liability in whole or in part and notify Owner citing reasons therefor.
5. If Surety does not proceed as provided in Paragraph 4 with reasonable promptness, Surety shall be deemed to be in default on this Bond 15 days after receipt of an additional written notice from Owner to Surety demanding that Surety perform its obligations under this Bond, and Owner shall be entitled to enforce any remedy available to Owner. If Surety proceeds as provided in Paragraph 4.4, and Owner refuses the payment tendered or Surety has denied liability, in whole or in part, without further notice Owner shall be entitled to enforce any remedy available to Owner.
6. After Owner has terminated Contractor's right to complete the Contract, and if Surety elects to act under Paragraph 4.1, 4.2, or 4.3 above, then the responsibilities of Surety to Owner shall not be greater than those of Contractor under the Contract, and the responsibilities of Owner to Surety shall not be greater than those of Owner under the Contract. To a limit of the amount of this Bond, but subject to commitment by Owner of the Balance of the Contract Price to mitigation of costs and damages on the Contract, Surety is obligated without duplication for:
  - 6.1. The responsibilities of Contractor for correction of defective Work and completion of the Contract;
  - 6.2. Additional legal, design professional, and delay costs resulting from Contractor's Default, and resulting from the actions or failure to act of 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 non-performance of Contractor.
7. Surety shall not be liable to Owner or others for obligations of 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 Owner or its heirs, executors, administrators, or successors.
8. Surety hereby waives notice of any change, including changes of time, to 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 Contractor ceased working or within two years after 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 Surety, Owner, or 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 requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted herefrom and provisions conforming to such statutory 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 Owner to Contractor under the Contract after all proper adjustments have been made, including allowance to Contractor of any amounts received or to be received by Owner in settlement of insurance or other Claims for damages to which Contractor is entitled, reduced by all valid and proper payments made to or on behalf of Contractor under the Contract.
  - 12.2. Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.
  - 12.3. Contractor Default: Failure of Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.
  - 12.4. Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract or to perform and complete or comply with the other terms thereof.

**FOR INFORMATION ONLY – Name, Address and Telephone**

Surety Agency or Broker:

Owner's Representative (engineer or other party):

**Alliance Consulting Engineers, Inc.  
 Post Office Box 8147  
 Columbia, SC 29202-8147  
 (803) 779-2078**

SECTION 00 61 13.16

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: Newberry County
Post Office Box 156 (Mailing)
1309 College Street (Physical)
Newberry, SC 29108

CONTRACT

Date:

Amount:

Description (Name and Location):

Phase IIA and III Roadway, Water and Wastewater Improvements Mid-Carolina Commerce Park for Newberry County, South Carolina

BOND

Bond Number:

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.

CONTRACTOR AS PRINCIPAL
Company:

SURETY

Signature: \_\_\_\_\_ (Seal)
Name and Title:

\_\_\_\_\_ (Seal)
Surety's Name and Corporate Seal

By: \_\_\_\_\_
Signature and Title
(Attach Power of Attorney)

(Space is provided below for signatures of additional parties, if required.)

Attest: \_\_\_\_\_
Signature and Title

CONTRACTOR AS PRINCIPAL
Company:

SURETY

Signature: \_\_\_\_\_ (Seal)
Name and Title:

\_\_\_\_\_ (Seal)
Surety's Name and Corporate Seal

By: \_\_\_\_\_
Signature and Title
(Attach Power of Attorney)

Attest: \_\_\_\_\_
Signature and Title:

1. Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to Owner to pay for labor, materials, and equipment furnished by Claimants for use in the performance of the Contract, which is incorporated herein by reference.
2. With respect to Owner, this obligation shall be null and void if Contractor:
  - 2.1. Promptly makes payment, directly or indirectly, for all sums due Claimants, and
  - 2.2. Defends, indemnifies, and holds harmless Owner from all claims, demands, liens, or suits alleging non-payment by Contractor by any person or entity who furnished labor, materials, or equipment for use in the performance of the Contract, provided Owner has promptly notified Contractor and 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 Contractor and Surety, and provided there is no Owner Default.
3. With respect to Claimants, this obligation shall be null and void if Contractor promptly makes payment, directly or indirectly, for all sums due.
4. Surety shall have no obligation to Claimants under this Bond until:
  - 4.1. Claimants who are employed by or have a direct contract with Contractor have given notice to Surety (at the addresses described in Paragraph 12) and sent a copy, or notice thereof, to 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 Contractor:
    1. Have furnished written notice to Contractor and sent a copy, or notice thereof, to 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 or equipment were furnished or supplied, or for whom the labor was done or performed; and
    2. Have either received a rejection in whole or in part from Contractor, or not received within 30 days of furnishing the above notice any communication from Contractor by which 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 Surety and sent a copy, or notice thereof, to Owner, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to Contractor.
5. If a notice by a Claimant required by Paragraph 4 is provided by Owner to Contractor or to Surety, that is sufficient compliance.
6. When a Claimant has satisfied the conditions of Paragraph 4, the Surety shall promptly and at Surety's expense take the following actions:
  - 6.1. Send an answer to that Claimant, with a copy to 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. 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 Surety.
8. Amounts owed by Owner to Contractor under the Contract shall be used for the performance of the Contract and to satisfy claims, if any, under any performance bond. By Contractor furnishing and Owner accepting this Bond, they agree that all funds earned by Contractor in the performance of the Contract are dedicated to satisfy obligations of Contractor and Surety under this Bond, subject to Owner's priority to use the funds for the completion of the Work.
9. Surety shall not be liable to Owner, Claimants, or others for obligations of Contractor that are unrelated to the Contract. 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. 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 Surety, Owner, or Contractor shall be mailed or delivered to the addresses shown on the signature page. Actual receipt of notice by Surety, Owner, or 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 requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted herefrom and provisions conforming to such statutory 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, 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 Contractor, or with a first-tier subcontractor of 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 Contractor and 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 Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.
- 15.3. Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract or to perform and complete or comply with the other terms thereof.

**FOR INFORMATION ONLY – Name, Address and Telephone**

**Surety Agency or Broker:**

**Owner's Representative: Alliance Consulting Engineers, Inc.  
Post Office Box 8147  
Columbia, SC 29202-8147  
(803) 779-2078**

**SECTION 00 62 76**

**APPLICATION FOR PAYMENT**

**Contractor's Application For Payment No. \_\_\_\_\_**

	Application Period:	Application Date:
To (Owner): <b>Newberry County</b>	From (Contractor):	Via (Engineer) Alliance Consulting Engineers, Inc.
Project: <b>Phase IIA and III Roadway, Water and Wastewater Improvements Mid-Carolina Commerce Park for Newberry County, South Carolina</b>	Contract:	
Owner's Contract No.: <b>2021-11</b>	Contractor's Project No.:	Engineer's Project No.: <b>17113-0036</b>

**APPLICATION FOR PAYMENT**

**Change Order Summary**

Approved Change Orders		
Number	Additions	Deductions
<b>TOTALS</b>		
NET CHANGE BY CHANGE ORDERS		

<b>1. ORIGINAL CONTRACT PRICE</b> .....	\$	
<b>2. Net change by Change Orders</b> .....	\$	
<b>3. CURRENT CONTRACT PRICE (Line 1 ± 2)</b> .....	\$	
<b>4. TOTAL COMPLETED AND STORED TO DATE</b> (Column F on Progress Estimate) .....	\$	
<b>5. RETAINAGE:</b>		
a. _____ % x \$ _____ <b>Work Completed</b> .....	\$	
b. _____ % x \$ _____ <b>Stored Material</b> .....	\$	
c. <b>Total Retainage (Line 5a + Line 5b)</b> .....	\$	
<b>6. AMOUNT ELIGIBLE TO DATE (Line 4 - Line 5c)</b> .....	\$	
<b>7. LESS PREVIOUS PAYMENTS (Line 6 from prior Application)</b> .....	\$	
<b>8. AMOUNT DUE THIS APPLICATION</b> .....	\$	
<b>9. BALANCE TO FINISH, PLUS RETAINAGE</b> (Column G on Progress Estimate + Line 5 above) .....	\$	

**CONTRACTOR'S CERTIFICATION**

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

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

is recommended by: \_\_\_\_\_  
Benjamin S. Whaley, P.E. (Date)

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

is approved by: \_\_\_\_\_  
Newberry County (Date)

By: \_\_\_\_\_ Date: \_\_\_\_\_





# Stored Material Summary

# Contractor's Application

For (contract): <b>Phase IIA and III Roadway, Water and Wastewater Improvements Mid-Carolina Commerce Park for Newberry County, South Carolina</b>						Application Number:			
Application Period:						Application Date:			
A	B	C	D		E		F		G
Invoice No.	Shop Drawing Transmittal No.	Materials Description	Stored Previously		Stored this Month		Incorporated in Work		Materials Remaining in Storage (\$) (D + E - F)
			Date (Month/Year)	Amount (\$)	Amount (\$)	Subtotal	Date (Month/Year)	Amount (\$)	
		Totals							







SECTION 00 63 63

CHANGE ORDER

No. \_\_\_\_\_

Date of Issuance: \_\_\_\_\_ Effective Date: \_\_\_\_\_

Project: <b>Phase IIA and III Roadway, Water and Wastewater Improvements Mid-Carolina Commerce Park for Newberry County, South Carolina</b>	Owner: <b>Newberry County</b>	Owner's Contract No.: <b>2021-11</b>
Contract: <b>Phase IIA and III Roadway, Water and Wastewater Improvements Mid-Carolina Commerce Park for Newberry County, South Carolina</b>		Date of Contract:
Contractor:		Engineer's Project No.: <b>17113-0036</b>

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

Description:  
\_\_\_\_\_  
\_\_\_\_\_

Attachments: (List documents supporting change):  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

<b>CHANGE IN CONTRACT PRICE:</b>	<b>CHANGE IN CONTRACT TIMES:</b>
Original Contract Price:  \$ _____	Original Contract Times: <input type="checkbox"/> Working days <input type="checkbox"/> Calendar days Substantial completion (days or date): _____ Ready for final payment (days or date): _____
[Increase] [Decrease] from previously approved Change Orders No. _____ to No. _____:  \$ _____	[Increase] [Decrease] from previously approved Change Orders No. _____ to No. _____: Substantial completion (days): _____ Ready for final payment (days): _____
Contract Price prior to this Change Order:  \$ _____	Contract Times prior to this Change Order: Substantial completion (days or date): _____ Ready for final payment (days or date): _____
[Increase] [Decrease] of this Change Order:  \$ _____	[Increase] [Decrease] of this Change Order: Substantial completion (days or date): _____ Ready for final payment (days or date): _____
Contract Price incorporating this Change Order:  \$ _____	Contract Times with all approved Change Orders: Substantial completion (days or date): _____ Ready for final payment (days or date): _____

<b>REQUESTED:</b>	<b>RECOMMENDED:</b>	<b>APPROVED:</b>
By: _____ Contractor: (Authorized Signature)	By: _____ Engineer: Benjamin S. Whaley, P.E.	By: _____ Owner: Newberry County
Date: _____	Date: _____	Date: _____
Approved by Funding Agency (if applicable): _____		Date: _____

SECTION 00 65 16

CERTIFICATE OF SUBSTANTIAL COMPLETION

Project: <b>Phase IIA and III Roadway, Water and Wastewater Improvements Mid-Carolina Commerce Park for Newberry County, South Carolina</b>	Owner: <b>Newberry County</b>	Owner's Contract No.: <b>2021-11</b>
Contract:		Date of Contract:
Contractor:		Engineer's Project No.: <b>17113-0036</b>

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

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

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

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

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

- Amended Responsibilities
- Not Amended

Owner's Amended Responsibilities:

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Contractor's Amended Responsibilities:

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

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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 Engineer: Benjamin S. Whaley, P.E. \_\_\_\_\_ Date \_\_\_\_\_

Accepted by Contractor: \_\_\_\_\_ Date \_\_\_\_\_

Accepted by Owner: Newberry County \_\_\_\_\_ Date \_\_\_\_\_

SECTION 00 65 19.13

CONTRACTOR'S AFFIDAVIT

The State of \_\_\_\_\_ Date: \_\_\_\_\_

The County of \_\_\_\_\_

The City/Town of \_\_\_\_\_

\_\_\_\_\_ of \_\_\_\_\_  
(Officer's Name) (Officer's Title) (Contractor's Name)

being duly sworn, deposes and says that \_\_\_\_\_  
(Contractor's Name)

has furnished all labor and material entering into the **Phase IIA and III Roadway, Water and Wastewater Improvements Mid-Carolina Commerce Park for Newberry County, South Carolina**  
(Name and Location of Work)

called for in the Contract Documents dated \_\_\_\_\_ with **Newberry County** states further that this officer has full knowledge of all obligations for such labor and materials, which have entered into and become part of that certain project known and designated above, and that this officer further deposes and says that all debts and other obligations for such labor and materials have been fully and completely paid for in good and lawful money of the United States of America and that there are no suits for damages against them proceeding, prospective and/or otherwise, in consequence of their operations on the above said project.

The said \_\_\_\_\_ will hold the Owners, **Newberry County**, blameless of any and all mechanic's liens that may be hereafter entered or filed for record, so as to constitute charge against said premises for work or labor done or materials furnished by them.  
(Contractor's Name) (Owner's Name)

IN WITNESS HEREOF, this officer has heretofore put his hand and seal:

\_\_\_\_\_  
(Seal) (Officer's Name)

I, \_\_\_\_\_, Notary Public in and for the above named County and State do hereby certify that \_\_\_\_\_ personally known to me to be the affiant in the foregoing Affidavit, personally appeared before me this day and, having been duly sworn, deposes and says that the facts set forth in the above Affidavit are true and correct.  
(Officer's Name)

WITNESS my hand and seal this \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_

\_\_\_\_\_  
(Seal)

Notary Public for the State of \_\_\_\_\_ My Commission Expires: \_\_\_\_\_

## SECTION 00 70 00

### STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

#### PART 1 - DEFINITIONS AND TERMINOLOGY

##### 1.01 Defined Terms

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

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

27. Notice of Award – The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.
28. Notice to Proceed – A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.
29. Owner – The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.
30. PCBs – Polychlorinated biphenyls.
31. Petroleum – Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.
32. Progress Schedule – A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.
33. Project – The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
34. Project Manual – The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.
35. Radioactive Material – Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
36. Related Entity – An officer, director, partner, employee, agent, consultant, or subcontractor.
37. Resident Project Representative – The authorized representative of Engineer who may be assigned to the Site or any part thereof.
38. 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.
39. Schedule of Submittals – A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.
40. Schedule of Values – A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.
41. 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.



42. 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.
43. Specifications – That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.
44. 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.
45. Substantial Completion – The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.
46. Successful Bidder – The Bidder submitting a responsive Bid to whom Owner makes an award.
47. Supplementary Conditions – That part of the Contract Documents which amends or supplements these General Conditions.
48. Supplier – A manufacturer, fabricator, supplier, distributor, material man, 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.
49. Underground Facilities – All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including 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.
50. Unit Price Work – Work to be paid for on the basis of unit prices.
51. Work – The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.
52. Work Change Directive – A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

## 1.02 Terminology

- A. The following words or terms are not defined but, when used in the Bidding Requirements or Contract Documents, have the following meaning.
- B. Intent of Certain Terms or Adjectives
1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action or determination will be solely to evaluate, in general, the Work for compliance with the 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 otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.
- C. Day
1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. Defective
1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
    - a. does not conform to the Contract Documents, or
    - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents, or
    - c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).
- E. Furnish, Install, Perform, Provide
1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
  2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
  4. When “furnish,” “install,” “perform,” or “provide” is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, “provide” is implied.
- F. Unless stated otherwise in the Contract Documents, words or phrases which have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

## **PART 2 - PRELIMINARY MATTERS**

### **2.01 Delivery of Bonds and Evidence of Insurance**

- A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. Evidence of Insurance: Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the General 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 Part 5.

### **2.02 Copies of Documents**

- A. Owner shall furnish to Contractor up to six (6) printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

### **2.03 Commencement of Contract Times; Notice to Proceed**

- A. The Notice to Proceed shall follow the Notice of Intent to Award, after Council has awarded and the protest period has expired. The official date of commencement will be the date of Notice to Proceed.

### **2.04 Starting the Work**

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

### **2.05 Before Starting Construction**

- A. *Preliminary Schedules:* Within ten (10) days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:
  1. a preliminary Progress Schedule; indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;
  2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

#### **2.06 Preconstruction Conference**

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

#### **2.07 Initial Acceptance of Schedules**

- A. At least ten (10) days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional ten (10) days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.
  1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
  2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
  3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

### **PART 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE**

#### **3.01 Intent**

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. 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 Part 9.

### 3.02 Reference Standards

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

1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
2. No provision of any such standard, specification, manual or code, or any instruction of a Supplier shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, or Engineer, or any of, their Related Entities, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

### 3.03 Reporting and Resolving Discrepancies

#### A. Reporting Discrepancies

1. *Contractor's Review of Contract Documents Before Starting Work:* Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor may discover and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.
2. *Contractor's Review of Contract Documents During Performance of Work:* If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and 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 promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor 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 by either a Change Order or a Work Change Directive.
- B. The requirements of the Contract Documents may be supplemented and minor variations and deviations in the Work may be authorized, by one or more of the following ways:
  - 1. A Field Order;
  - 2. Engineer's approval of a Shop Drawing or Sample; (Subject to the provisions of Paragraph 6.17.D.3); or
  - 3. Engineer's written interpretation or clarification.

### **3.05 Reuse of Documents**

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

### **3.06 Electronic Data**

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

from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

#### **PART 4 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS**

##### **4.01 Availability of Lands**

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.
- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

##### **4.02 Subsurface and Physical Conditions**

- A. Reports and Drawings: Reports of explorations and tests of subsurface conditions at or contiguous to the Site that Engineer has used in preparing the Bidding Documents including the Report of Reconnaissance of Subsurface Exploration of the Mid-Carolina Commerce Park Phase IIA & III Roadway, Newberry County, South Carolina; S&ME Project No. 1611-09-106 completed for the project by S&ME, Inc. on April 24, 2009.

##### **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 9.07 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 with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or
    - b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or
    - c. Contractor failed to give the written notice as required by Paragraph 4.03.A.
  3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, Owner and Engineer, and any of their Related Entities 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:
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. Engineer will 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 Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

**4.05 Reference Points**

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

**4.06 Hazardous Environmental Condition at Site**

- A. Reports and Drawings: No reports on drawings related to Hazardous Environmental Conditions are known to the Owner or Engineer.
- B. Limited Reliance by Contractor on Technical Data Authorized: Not used.

## **PART 5 - BONDS AND INSURANCE**

### **5.01 Performance, Payment, and Other Bonds**

- A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.
- 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 the 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 promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

### **5.02 Licensed Sureties and Insurers**

- A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications.

### **5.03 Certificates of Insurance**

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

### **5.04 Contractor's 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:
  - a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or
  - b. by any other person for any other reason;
5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and
6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

B. The policies of insurance required by this Paragraph 5.04 shall:

1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, include as additional insured (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;
2. include at least the specific coverages and be written for not less than the limits of liability provided 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 6.11 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 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 two years after final payment.
  - a. Contractor shall furnish Owner and each other additional insured to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.
  
- C. The limits of liability for the 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: South Carolina  
Statutory Benefits
    - b. Applicable Federal (e.g., Longshoreman's): Statutory
    - c. Employer's Liability:
 

Each Accident	\$500,000
Disease-Policy Limit	\$500,000
Disease-Each Employee	\$500,000
  2. Contractor's General Liability under Paragraphs 5.04.A.3 through 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 Contractor and for this project only:
    - a. General Aggregate \$2,000,000
    - b. Products - Completed Operations Aggregate \$2,000,000
    - c. Personal and Advertising Injury \$1,000,000
    - d. Each Occurrence (Bodily Injury and Property Damage) \$1,000,000
    - e. Fire Damage (any one (1) fire) \$50,000
    - f. Medical Expense (any one (1) person) \$5,000
    - g. Property Damage liability insurance will provide Explosion, Collapse, and Under-ground coverages where applicable.
    - h. Excess or Umbrella Liability
      - 1) General Aggregate \$2,000,000
      - 2) Each Occurrence \$2,000,000
  3. Automobile Liability under Paragraph 5.04.A.6 of the General Conditions:

- a. Include coverage for all owned, hired and non-owned automobiles.
  - b. Combined Single Limit of \$1,000,000
4. The Contractual Liability coverage required by Paragraph 5.04.B.4 of the General Conditions shall provide coverage for not less than the following amounts:
- a. Bodily Injury:
 

Each Accident	\$2,000,000
Annual Aggregate	\$2,000,000
  - b. Property Damage:
 

Each Accident	\$2,000,000
Annual Aggregate	\$2,000,000
5. Flood Insurance: The Contractor is required to carry flood insurance for projects located in designated flood hazard areas in which Federal Flood Insurance is available.

**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. Contractor shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof.
1. This insurance shall:
- a. include the interests of Owner, Contractor, Subcontractors, Engineer and any other individuals or entities identified herein, and the officers, directors, partners, employees, agents and other consultants and subcontractors of any of them each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured;
  - b. in addition to the individuals and entities specified, include as additional insureds, the following:
    - 1) Newberry County**
  - c. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss and damage to the Work, temporary buildings, falsework, and materials and equipment in transit and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than that caused by flood), and such other perils or causes of loss as may be specifically required;
  - d. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
  - e. 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;

- f. allow for partial utilization of the Work by Owner;
  - g. include testing and startup; and
  - h. 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.
- 2. Contractor shall be responsible for any deductible or self-insured retention.
  - 3. The policies of insurance required to be purchased and maintained by Contractor in accordance with this Paragraph SC-5.06.A shall comply with the requirements of paragraph 5.06.C of the General Conditions.
- B. Owner shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured.
  - C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least thirty (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.
  - D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified. 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, and Engineer, and all other individuals or entities identified to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or additional insureds thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors, and Engineer, and all other individuals or entities identified to be listed as insured or additional insured (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) under

such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.

#### **5.08 Receipt and Application of Insurance Proceeds**

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

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

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

#### **5.10 Partial Utilization, Acknowledgment of Property Insurer**

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

## **PART 6 - CONTRACTOR'S RESPONSIBILITIES**

### **6.01 Supervision and Superintendence**

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances. 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 and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

### **6.03 Services, Materials, and Equipment**

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, startup, and completion of the Work.
- B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

### **6.04 Progress Schedule**

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.



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

#### **6.05 Substitutes and “Or-Equals”**

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

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

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

- 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
- 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole,
- 3) it has a proven record of performance and availability of responsive service; and

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

- 1) there will be no increase in cost to the Owner or increase in Contract Times, and
- 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

#### **2. Substitute Items**

- a. If in Engineer’s sole discretion an item of material or equipment proposed by Contractor does not qualify as an “or-equal” item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.
- b. Contractor shall submit sufficient information as provided below to allow Engineer to determine 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 requirements 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.
  - d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
    - 1) shall certify that the proposed substitute item will:
      - a) perform adequately the functions and achieve the results called for by the general design,
      - b) be similar in substance to that specified, and
      - c) be suited to the same use as that specified;
    - 2) will state:
      - a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time;
      - b) 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 other work on the Project) to adapt the design to the proposed substitute item; and
      - c) 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;
    - 3) will identify:
      - a) all variations of the proposed substitute item from that specified, and
      - b) available engineering, sales, maintenance, repair, and replacement services;
    - 4) and shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change,
- B. Substitute Construction Methods or Procedures: If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.
- C. Engineer's Evaluation: Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or

utilized until Engineer's review is complete, which will be evidenced by 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.
- E. Engineer's Cost Reimbursement: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute item so proposed or submitted by Contractor, Contractor shall reimburse Owner for the charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- F. Contractor's Expense: Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

#### **6.06 Concerning Subcontractors, Suppliers, and Others**

- A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.
- B. 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, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.
- C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:
  - 1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity, nor
  - 2. shall anything in the Contract Documents 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 rights against Owner, Contractor, and Engineer,, and all other individuals or entities to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.
- H. Owner or Engineer may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by a particular Subcontractor or Supplier.

#### **6.07 Patent Fees and Royalties**

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

#### **6.08 Permits**

- A. Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all

governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

#### **6.09 Laws and Regulations**

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's 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 shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

#### **6.10 Taxes**

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

#### **6.11 Use of Site and Other Areas**

- A. Limitation on Use of Site and Other Areas
  - 1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.
  - 2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.
  - 3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other

party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

- B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.
- C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.
- D. *Loading Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

#### **6.12 Record Documents**

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

#### **6.13 Safety and Protection**

- A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:
  - 1. all persons on the Site or who may be affected by the Work;
  - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
  - 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.
- C. 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 , 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).

- D. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

#### **6.14 Safety Representative**

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

#### **6.15 Hazard Communication Programs**

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

#### **6.16 Emergencies**

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

#### **6.17 Shop Drawings and Samples**

- A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the acceptable Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.
  - 1. Shop Drawings
    - a. Submit number of copies specified in the General Requirements.
    - b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.
  - 2. Samples: Contractor shall also submit Samples to Engineer for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample submittals.
    - a. Submit number of Samples specified in the Specifications.

- b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.
- B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.
- C. Submittal Procedures
  - 1. Before submitting each Shop Drawing or Sample, Contractor shall have determined and verified:
    - a. all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
    - b. the suitability of 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 Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto; and
    - d. 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 certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.
  - 3. With each submittal, Contractor shall give Engineer specific written notice of any variations, that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawing's or Sample Submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.
- D. Engineer's Review
  - 1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
  - 2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The



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

3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. Resubmittal Procedures

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, 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.
- F. Contractor shall furnish required submittals with sufficient information and accuracy in order to obtain required approval of an item with no more than three (3) submittals. Engineer will record Engineer's time for reviewing subsequent submittals of Shop Drawings, samples or other items requiring approval and Contractor shall reimburse Owner for Engineer's charges for such time.
- G. In the event that Contractor requests a substitution for a previously approved item, Contractor shall reimburse Owner for Engineer's charges for such time unless the need for such substitution is beyond the control of Contractor.

**6.18 Continuing the Work**

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

**6.19 Contractor's General Warranty and Guarantee**

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its Related Entities shall be entitled to rely on representation of Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
  2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:

1. observations by Engineer;
  2. recommendation by Engineer or payment by Owner of any progress or final payment;
  3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
  4. use or occupancy of the Work or any part thereof by Owner;
  5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;
  6. any inspection, test, or approval by others; or
  7. any correction of defective Work by Owner.
- D. The Contractor's General Warranty and Guarantee shall be for a period of one (1) year after work has been accepted and final payment made to the Contractor. In the case of Water and Wastewater lines, the warranty period will start after acceptance of these lines into the utility provider's system for ownership, operation, and maintenance. The Contractor accepts the transference of all warranties and guarantees to the utility provider owning and operating the new lines.

## **6.20 Indemnification**

- A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable .
- B. In any and all claims against Owner or Engineer or any of their 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 officers, directors, partners, employees, agents, consultants and subcontractors arising out of:
  1. the preparation or approval of, or the failure to prepare or approve, maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or

2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

## **6.21 Delegation of Professional Design Services**

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.
- B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.
- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

## **PART 7 - OTHER WORK AT THE SITE**

### **7.01 Related Work at Site**

- A. Owner may perform other work related to the Project at the Site with Owner's employees or via other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:
  1. written notice thereof will be given to Contractor prior to starting any such other work; and
  2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.
- B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, 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. 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 Part 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:
  - 1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;
  - 2. the specific matters to be covered by such authority and responsibility will be itemized; and
  - 3. the extent of such authority and responsibilities will be provided.
- B. Owner shall have sole authority and responsibility for such coordination.

## **7.03 Legal Relationships**

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

#### **7.04 Claims Between Contractors**

- A. Should Contractor cause damage to the work or property of any other contractor at the Site, or should any claim arising out of Contractor's performance of the Work at the Site be made by any other contractor against Contractor, Owner, Engineer, or the construction coordinator, Contractor shall promptly attempt to settle with such other contractor by agreement, or to otherwise resolve the dispute by arbitration or at law.
- B. Contractor shall, to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner, Engineer, the construction coordinator 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, fees and charges of engineers, architects, attorneys, and other professionals and court and arbitration costs) arising directly, indirectly or consequentially out of any action, legal or equitable, brought by any other contractor against Owner, Engineer, Engineer's Consultants, or the construction coordinator to the extent said claim is based on or arises out of Contractor's performance of the Work. Should another contractor cause damage to the Work or property of Contractor or should the performance of work by any other contractor at the Site give rise to any other Claim, Contractor shall not institute any action, legal or equitable, against Owner, Engineer, or the construction coordinator or permit any action against any of them to be maintained and continued in its name or for its benefit in any court or before any arbiter which seeks to impose liability on or to recover damages from Owner, Engineer, or the construction coordinator on account of any such damage or Claim.
- C. If Contractor is delayed at any time in performing or furnishing Work by any act or neglect of another contractor, and Owner and Contractor are unable to agree as to the extent of any adjustment in Contract Times attributable thereto, Contractor may make a Claim for an extension of times in accordance with Part 12. An extension of the Contract Times shall be Contractor's exclusive remedy with respect to Owner, Engineer, and construction coordinator for any delay, disruption, interference, or hindrance caused by any other contractor. This paragraph does not prevent recovery from Owner, Engineer, or construction coordinator for activities that are their respective responsibilities.

### **PART 8 - OWNER'S RESPONSIBILITIES**

#### **8.01 Communications to Contractor**

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

#### **8.02 Replacement of Engineer**

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

#### **8.03 Furnish Data**

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

#### **8.04 Pay When Due**

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

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

- A. Owner's duties 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 Part 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 thereof will be as set forth.
- B. On request of Contractor prior to the execution of any Change Order involving a significant increase in the Contract Price, Owner shall furnish to Contractor reasonable evidence that adequate financial arrangements have been made by Owner to enable Owner to fulfill the increased financial obligations to be undertaken by Owner as a result of such Change Order.

### **PART 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 and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

## **9.03 Project Representative**

- A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. 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 Paragraph 9.09.

## **9.04 Authorized Variations in Work**

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

## **9.05 Rejecting Defective Work**

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

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

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

#### **9.07 Determinations for Unit Price Work**

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

#### **9.08 Decisions on Requirements of Contract Documents and Acceptability of Work**

- A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.
- B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believe that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.
- C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.
- D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

#### **9.09 Limitations on Engineer's Authority and Responsibilities**

- A. Neither Engineer's authority or responsibility under this Part 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.
- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the



safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to, the Resident Project Representative, if any, and assistants, if any.

## **PART 10 - CHANGES IN THE WORK; CLAIMS**

### **10.01 Authorized Changes in the Work**

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by 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 covering:
  - 1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;
  - 2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and
  - 3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu

of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

#### **10.04 Notification to Surety**

- A. If 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**

- A. Engineer's Decision Required: All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.
- B. Notice: Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract 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).
- C. Engineer's Action: Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:
  - 1. deny the Claim in whole or in part,
  - 2. approve the Claim, or
  - 3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.
- D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.
- E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Part 16 within 30 days of such action or denial.

- F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

## **PART 11 - COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK**

### **11.01 Cost of the Work**

- A. Costs Included: The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall 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 Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.
  4. Costs of special consultants (including but not limited to Engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
  5. Supplemental costs including the following:
    - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.

- b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
- c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
- 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 other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.
- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, expresses, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

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

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

3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
  4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
  5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A 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 Allowances**

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

## **11.03 Unit Price Work**

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal

to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

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

## **PART 12 - CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES**

### **12.01 Change of Contract Price**

- A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:
  - 1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or
  - 2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or
  - 3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).
- C. Contractor's Fee: The Contractor's fee for overhead and profit shall be determined as follows:
  - 1. a mutually acceptable fixed fee; or

2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
  - a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;
  - b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;
  - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of 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 may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Part 12.

## **12.03 Delays**

- A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Part 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.
- B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Part 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

- C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.
- D. Owner, Engineer and the Related Entities of each of them shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of Engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.
- E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

## **PART 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 Part 13.

### **13.02 Access to Work**

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, 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.C; and
  - 3. as otherwise specifically provided in the Contract Documents.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other



- representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.
  - E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, 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.
- C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.
- D. If, the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

#### **13.05 Owner May Stop the Work**

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

### **13.06 Correction or Removal of Defective Work**

- A. Promptly after receipt of notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).
- B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

### **13.07 Correction Period**

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
  - 1. repair such defective land or areas; or
  - 2. correct such defective Work; or
  - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
  - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitation or repose.

### **13.08 Acceptance of Defective Work**

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and 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 (7) days written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.
- C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

## **PART 14 - PAYMENTS TO CONTRACTOR AND COMPLETION**

### **14.01 Schedule of Values**

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

### **14.02 Progress Payments**

#### **A. Applications for Payments**

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.
2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

#### **B. Review of Applications**

1. Engineer will, within fifteen (15) 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, to a final determination of quantities and classifications for Unit

Price Work under Paragraph 9.07, 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:
    - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or
    - b. 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:
    - a. to supervise, direct, or control the Work, or
    - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
    - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
    - d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or
    - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
  5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:
    - a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
    - b. the Contract Price has been reduced by Change Orders;
    - c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
    - d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

### C. Payment Becomes Due

1. Fifteen (15) days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

**D. Reduction in Payment**

1. Owner may refuse to make payment of the full amount recommended by Engineer because:
  - a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;
  - b. Liens 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 will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor 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.
- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative 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 (7) days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of

the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will within 14 days after submission of the tentative certificate to Owner notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will within said 14 days execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.

- D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.
- E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to complete or correct items on the tentative list.

#### **14.05 Partial Utilization**

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions.
  - 1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor 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.
  - 2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
  - 3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
  - 4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

#### **14.06 Final Inspection**

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

#### **14.07 Final Payment**

##### **A. Application for Payment**

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.
2. The final Application for Payment shall be accompanied (except as previously delivered) by:
  - a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.7;
  - b. consent of the surety, if any, to final payment;
  - c. a list of all Claims against Owner that Contractor believes are unsettled; and
  - d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner 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. Engineer's Review of Application and Acceptance**

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten (10) days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final



payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. Payment Becomes Due

1. Thirty (30) days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and, will be paid by Owner to Contractor.

**14.08 Final Completion Delayed**

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

**14.09 Waiver of Claims**

- A. The making and acceptance of final payment will constitute:
1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and
  2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

**PART 15 - SUSPENSION OF WORK AND TERMINATION**

**15.01 Owner May Suspend Work**

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

**15.02 Owner May Terminate for Cause**

- A. The occurrence of any one or more of the following events will justify termination for cause:
1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or

- suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);
2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;
  3. Contractor's disregard of the authority of Engineer; or
  4. Contractor's violation in any substantial way of any provisions of the Contract Documents.
- B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven (7) days written notice of its intent to terminate the services of Contractor:
1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion),
  2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and
  3. complete the Work as Owner may deem expedient.
- C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph Owner shall not be required to obtain the lowest price for the Work performed.
- D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven (7) days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.
- E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.
- F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B, and 15.02.C.

### **15.03 Owner May Terminate For Convenience**

- A. Upon seven (7) days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
  - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
  - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;
  - 3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and
  - 4. reasonable expenses directly attributable to termination.
- B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

### **15.04 Contractor May Stop Work or Terminate**

- A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven (7) days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven (7) days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 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.

## **PART 16 - DISPUTE RESOLUTION**

### **16.01 Methods and Procedures**

- A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American

Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.

- B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.
- C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:
  - 1. elects in writing to invoke any dispute resolution process, or
  - 2. agrees with the other party to submit the Claim to another dispute resolution process, or
  - 3. gives written notice to the other party of their intent to submit the Claim to a court of competent jurisdiction.

## **PART 17 - MISCELLANEOUS**

### **17.01 Giving Notice**

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

### **17.02 Computation of Times**

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

### **17.03 Cumulative Remedies**

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

### **17.04 Survival of Obligations**

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations

indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

**17.05 Controlling Law**

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

**17.06 Headings**

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

**END OF SECTION**

## SECTION 01 06 00

### REGULATORY REQUIREMENTS

#### PART 1 GENERAL

##### 1.01 DESCRIPTION

- A. The following requirements of Regulatory Agencies having jurisdiction within this project area are considered a part of these Contract Documents.
- B. The project construction, including the letting of contracts, shall conform to any applicable requirements of the State, territorial and local laws and/or ordinances provided that these requirements do not conflict with any Federal laws and this sub-chapter.
- C. South Carolina Sales Tax: All applicable South Carolina sales tax shall be paid by the Contractor.
  - a. Use of chemicals: All chemicals used during the project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant or of other classification, must show approval of EPA or USDA. Use of all such chemicals and disposal of residues shall be in strict conformance with manufacturer's instructions.
- D. Safety and Health Regulations: The Contractor shall comply with the Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970 (PL 91-596) and under Section 107 of the Contract Work Hours and Safety Standards Act (PL 91-54).

##### 1.02 INSPECTION BY AGENCIES:

- A. The representatives of the South Carolina Department of Health and Environmental Control, Newberry County, Environmental Protection Agency, and if required, the U.S. Army Corps of Engineers shall have access to the work wherever it is, in preparation or in progress, and the Contractor shall provide proper facilities for such access and inspection.

#### PART 2 PRODUCTS - NOT USED

#### PART 3 EXECUTION - NOT USED

**END OF SECTION**

## SECTION 01 23 00

### BID ALTERNATES AND SUBSTITUTES

#### PART 1 GENERAL

##### 1.01 SUMMARY

- A. This Section includes administrative and procedural requirements for alternates.

##### 1.02 DEFINITIONS

- A. Bid Alternate: A scope of work proposed by the Bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept corresponding changes either in the amount of construction to be completed, or in the products, materials, equipment, systems or installation methods described in the Contract Documents. The selection of the successful bidder will be based on the Base Bid amount which does not include Alternate Bid Items.
  - 1. The cost or credit for each alternate is the net addition or deduction from the Contract Sum to incorporate alternates into the Work. No other adjustments are made to the Contract Sum related to this Definition.
- B. Base Bid: The amount for which the Bidder proposes to perform Work, not including that work for which Alternative Bid items and Substitutes are also submitted.

##### 1.03 PROCEDURES

- A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate or substitute into the Project.
  - 1. Include as part of each Alternate or Substitute, miscellaneous devices, accessory objects and similar items incidental to or required for a complete installation whether or not indicated as part of the alternate.
- B. Notification: Following award of the Contract, Engineer shall notify each party involved, in writing, of the status of each alternate or Substitute equipment. Engineer shall indicate if alternates and substitutes have been accepted, rejected, or deferred for later consideration. Where applicable, Contractor shall include a complete description of negotiated modifications to alternates or Substitutes offered.
- C. Execute accepted alternates under the same conditions as other work of the Contract.

#### PART 2 PRODUCTS - NOT USED

#### PART 3 EXECUTION

##### 3.01 SCHEDULE OF ALTERNATIVES

- A. A complete Schedule of Bid Alternates is detailed within the Bid Form Section 00 41 00 and other Division 0 Sections.

**END OF SECTION**

**SECTION 01 26 20**  
**WEATHER DELAYS**

**ARTICLE 1 - GENERAL**

**1.01 Extension of Contract Time**

If a Claim is made for an extension of time based upon weather delays in accordance with the General Conditions, an extension may be granted only for the number of Weather Delay Days in excess of the number of days listed for the applicable month on the Standard Baseline.

**2.01 Standard Baseline for Adverse Weather**

- A. The Standard Baseline is defined as the number of calendar days for each month during which construction activity exposed to weather conditions is expected to be prevented and suspended by cause of Adverse Weather. Suspension of construction activity for the number of days each month as listed in the Standard Baseline is included in the Work and is not eligible for extension of Contract Time.
- B. The Owner has established a Standard Baseline from the National Climatic Data Center (NCDC) from summary period of 1981 to 2010 and climate record period of 1887 to 2017 for the State of South Carolina.

**3.01 Adverse Weather and Weather Delay Days**

- A. Adverse Weather is defined as the occurrence of one or more of the following conditions within a twenty-four (24) hour day that prevents construction activity exposed to weather conditions or access to the site:
  - 1. Precipitation (rain, snow, or ice) in excess of one-tenth (0.10") liquid measure.
  - 2. Temperatures that do not rise above that required for the day's construction activity, if such temperature requirement is specified or accepted as standard industry practice.
  - 3. Sustained wind in excess of twenty-five (25) miles per hour.
  - 4. Dry Out (or Mud) Days under the following conditions:
    - a more precipitation days occur than listed in the Standard Baseline;
    - b there is a hindrance to site access or sitework and Contractor has taken all reasonable accommodations to avoid such hindrance; and,
    - c no more than one (1) Dry Out Day is allocated for each additional day of precipitation more than the Standard Baseline that total 1.0 inch or more, liquid measure, unless specifically recommended by the Designer.
- B. A Weather Delay Day may be counted if Adverse Weather prevents work on the project for fifty percent (50%) or more of the contractor's scheduled work day and critical path construction activities were included in the day's schedule, including a weekend day or holiday if Contractor has scheduled construction activities that day.
- C. Days of normal weather conditions which the contractor elects not to perform construction activities will be deducted from the eligible weather delays requested.



#### **4.01 Documentation and Submittals**

- A. An extension of the Contract Time for Adverse Weather must be requested in writing to the Designer at the end of each month and submitted with the pay application of applicable Adverse Weather occurrence along with all required support information. Such requests made after this limitation will not be considered.
- B. Submit daily jobsite work logs showing which and to what extent critical path construction activities have been affected by weather on a monthly basis.
- C. Submit actual weather data to support claim for time extension obtained from nearest NOAA weather station or other independently verified source approved by Designer at beginning of project.
- D. Organize Claim documentation to facilitate evaluation on a basis of calendar month periods and the Standard Baseline.
- E. Submit in accordance with the requirements of the Contract Documents.

**END OF SECTION**

## Summary of Monthly Normals 1981-2010

Generated on 05/12/2021

Month		Temperature (°F)										Mean Number of Days										
		Mean					Cooling Degree Days					Heating Degree Days										
		Daily Max	Daily Min	Mean	Long Term Max Std Dev	Long Term Min Std Dev	Long Term Avg Std Dev	55	57	60	65	70	72	55	57	60	65	Max >= 100	Max >= 90	Max >= 50	Max <= 32	Min <= 0
01	53.6	31.4	42.5	3.8	3.8	3.6	10	6	3	-7777	0	0	398	455	545	698	0.0	0.0	20.1	0.5	16.7	0.0
02	58.1	33.5	45.8	3.4	2.5	2.7	20	12	4	-7777	-7777	0	277	325	402	538	0.0	0.0	21.2	0.1	13.0	0.0
03	66.2	39.2	52.7	3.4	2.8	2.8	76	52	27	6	1	-7777	147	186	254	388	0.0	0.0	29.2	0.0	7.9	0.0
04	74.0	48.0	61.0	3.1	2.7	2.6	212	168	112	44	10	3	32	48	82	164	0.0	0.1	29.8	0.0	1.3	0.0
05	82.1	58.0	70.1	2.4	3.2	2.5	468	408	320	185	79	49	2	3	8	29	0.0	2.8	30.9	0.0	0.0	0.0
06	88.8	66.9	77.8	2.7	1.8	1.9	685	625	536	387	243	188	0	0	-7777	1	0.1	12.9	30.0	0.0	0.0	0.0
07	91.9	70.6	81.3	2.5	1.3	1.6	814	752	659	504	349	288	0	0	0	-7777	1.0	21.1	31.0	0.0	0.0	0.0
08	90.1	69.5	79.8	3.0	1.8	2.1	769	707	614	459	305	244	0	0	0	-7777	0.8	16.1	31.0	0.0	0.0	0.0
09	84.1	62.4	73.2	2.4	2.1	1.7	548	488	399	259	138	98	-7777	-7777	2	12	0.0	5.3	30.0	0.0	0.0	0.0
10	74.2	50.5	62.4	2.2	3.4	2.5	249	200	138	60	17	9	21	34	65	142	0.0	0.3	31.0	0.0	0.3	0.0
11	65.1	40.8	53.0	3.2	3.7	3.1	74	52	28	7	1	1	135	174	240	368	0.0	0.0	28.8	0.0	6.3	0.0
12	56.1	33.2	44.6	4.7	4.2	4.3	23	15	7	1	-7777	0	343	398	482	632	0.0	0.0	21.8	0.2	15.0	0.0
Summary	73.7	50.3	62.0	3.1	2.8	2.6	3948	3485	2847	1912	1143	880	1355	1623	2080	2972	1.9	58.6	334.8	0.8	60.5	0.0

-7777: a non-zero value that would round to zero

Empty or blank cells indicate data is missing or insufficient occurrences to compute value

## Summary of Monthly Normals 1981-2010

Generated on 05/12/2021

		Precipitation (in.)									
		Mean Number of Days					Precipitation Probabilities Probability that precipitation will be equal to or less than the indicated amount				
		Daily Precipitation									
		>= 0.01	>= 0.10	>= 0.50	>= 1.00	0.25	0.50	0.75	1.00	1.25	1.50
Month	Totals	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
01		4.23	7.1	3.3	1.4	2.75	4.54	0.75	2.75	4.54	5.19
02		4.15	6.5	3.0	1.6	2.86	3.99	4.99	2.86	3.99	4.99
03		4.39	6.3	3.0	1.2	2.83	4.10	6.01	2.83	4.10	6.01
04		3.00	6.0	2.2	0.7	1.46	2.85	3.96	1.46	2.85	3.96
05		3.26	5.5	2.1	0.7	1.87	3.05	3.72	1.87	3.05	3.72
06		4.68	6.4	2.5	1.4	2.47	4.87	6.19	2.47	4.87	6.19
07		3.53	5.6	2.4	0.8	2.03	3.26	4.48	2.03	3.26	4.48
08		5.33	6.5	3.2	1.4	4.17	4.97	6.50	4.17	4.97	6.50
09		4.33	4.8	2.8	1.6	2.46	3.99	6.07	2.46	3.99	6.07
10		3.87	4.7	2.9	1.4	2.02	3.50	5.10	2.02	3.50	5.10
11		3.42	5.6	2.7	1.0	1.84	2.98	4.30	1.84	2.98	4.30
12		3.78	6.2	2.4	0.9	2.13	3.30	5.39	2.13	3.30	5.39
Summary		47.97	71.2	32.5	14.1	28.89	45.40	61.90	28.89	45.40	61.90

-7777: a non-zero value that would round to zero

Empty or blank cells indicate data is missing or insufficient occurrences to compute value

**Summary of Monthly Normals  
 1981-2010**

Generated on 05/12/2021

		Snow (in.)													
		Snowfall >= Thresholds						Snow Depth >= Thresholds						Snow Probabilities	
		Mean Number of Days						Probability that snow will be equal to or less than the indicated amount						Monthly Snow vs. Probability Levels Values derived from the incomplete gamma distribution.	
Month	Totals	0.01	1.0	3.0	5.00	10.00	1	3	5	10	.25	.50	.75		
01	0.3	0.2	0.2	-7777	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0		
02	0.4	0.2	0.1	-7777	0.0	0.0	0.2	0.1	0.1	0.0	0.0	0.0	0.0		
03	0.2	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0		
04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
09	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
12	0.1	-7777	-7777	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Summary	1.0	0.5	0.4	0.1	0.0	0.0	0.4	0.3	0.2	0.0	0.0	0.0	0.0		

-7777: a non-zero value that would round to zero

Empty or blank cells indicate data is missing or insufficient occurrences to compute value

## Summary of Monthly Normals 1981-2010

Generated on 05/12/2021

Growing Degree Units (Monthly)												
Base	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
40	151	203	402	630	931	1135	1279	1234	997	693	393	199
45	74	113	267	482	777	985	1124	1079	847	539	261	110
50	31	53	157	340	622	835	969	924	697	388	152	54
55	10	20	76	212	468	685	814	769	548	249	74	23
60	3	4	27	112	320	536	659	614	399	138	28	7
50/86	95	137	266	399	619	777	872	850	677	438	245	126
<b>Growing Degree Units for Corn (Monthly)</b>												

Growing Degree Units (Accumulated Monthly)												
Base	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
40	151	354	756	1386	2317	3452	4731	5965	6962	7655	8048	8247
45	74	187	454	936	1713	2698	3822	4901	5748	6287	6548	6658
50	31	84	241	581	1203	2038	3007	3931	4628	5016	5168	5222
55	10	30	106	318	786	1471	2285	3054	3602	3851	3925	3948
60	3	7	34	146	466	1002	1661	2275	2674	2812	2840	2847
50/86	95	232	498	897	1516	2293	3165	4015	4692	5130	5375	5501
<b>Growing Degree Units for Corn (Monthly Accumulated)</b>												

Note: For corn, temperatures below 50 are set to 50, and temperatures above 86 are set to 86.

-7777: a non-zero value that would round to zero.

Empty or blank cells indicate data is missing or insufficient occurrences to compute value.

## SECTION 01 30 00

### ADMINISTRATIVE REQUIREMENTS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Preconstruction meeting.
- B. Progress meetings
- C. Construction progress schedule
- D. Submittals for review, information and project closeout
- E. Number of copies of submittals
- F. Submittal procedures

##### 1.02 RELATED SECTIONS

- A. Document 00 70 00 - General Conditions: Dates for applications for payment
- B. Document 00 70 00 - General Conditions: Duties of the Construction Manager
- C. Section 01 70 00 - Execution Requirements: Additional coordination requirements
- D. Section 01 78 00 - Closeout Submittals: Project record documents
- E. Sections throughout these specifications may include other submittals that may be required for construction

##### 1.03 PROJECT COORDINATION

- A. Project Coordinator: Alliance Consulting Engineers, Inc.
- B. Cooperate with the Project Coordinator on the site for allocation of mobilization areas; for field offices and sheds, for access, traffic, and parking facilities
- C. During construction, coordinate use of site and facilities through the Project Coordinator
- D. Comply with Project Coordinator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.
- E. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities.
- F. Coordinate field engineering and layout work under instructions of the Project Coordinator.

- G. Make the following types of submittals through the Project Coordinator:
1. Requests for interpretation.
  2. Requests for substitution.
  3. Shop drawings, operation and maintenance manuals, product data, and samples.
  4. Manufacturer's instructions and field reports.
  5. Applications for payment and change order requests.
  6. Progress schedules.
  7. Coordination drawings.
  8. Closeout submittals.

## **PART 2 PRODUCTS - NOT USED**

## **PART 3 EXECUTION**

### **3.01 PRECONSTRUCTION MEETING**

- A. Engineer will schedule a meeting within thirty (30) days after the Owner has determined the low bidder and may be held prior to issuance of the Notice to Proceed when required by regulatory agencies having jurisdiction. In any event, the Meeting will be held prior to actual start of construction.
- B. For the individuals designated by the Contractor, his subcontractors and suppliers attending the Preconstruction Meeting, provide required authority to commit the entities they represent to solutions agreed upon in the meeting.
- C. Advise the Engineer at least twenty-hours (24) in advance of the meeting to add items to the agenda.
- D. Attendance Required:
1. Owner.
  2. Engineer.
  3. Contractor.
  4. Subcontractors, as needed.
  5. Utility Providers
  6. Permit Agents
- E. Agenda:
1. Execution of Owner-Contractor Contract Agreement.
  2. Distribution of Contract Documents.

3. Arrangement of Contractor's forces and personnel and those of subcontractors, material suppliers and the Engineer.
  4. Channels and procedures for communication.
  5. Designation of personnel representing the parties to Contract, Contractor, Owner and Engineer.
  6. Procedures and processing of field decisions, submittals and substitutions, applications for payments, proposal request, Change Orders and Contract closeout procedures.
  7. Scheduling.
  8. Scheduling activities of a Geotechnical Engineer
  9. Rules and regulations governing performance of the Work for security, quality control, housekeeping and related matters.
- F. Preconstruction Meeting minutes will be recorded and distributed within ten (10) days after meeting to participants, with three (3) copies to the Contractor and the required number of copies to the Owner, and those affected by decisions being made.

### **3.02 PROGRESS MEETINGS**

- A. Engineer will make arrangements for meetings, prepare agenda with copies for participants, and preside at meetings. Contractor must advise the Engineer within forty-eight (48) hours of advance notice of the meeting to add items to the agenda.
- B. The Contractor's relations with his subcontractors and material suppliers, and discussions with regards to these items are the Contractor's responsibility and normally not part of the project meeting agenda.
- C. For the individuals designated by the Contractor to attend and participate in the project meetings, provide required authority to commit the Contractor to solutions agreed upon in the project meetings.
- D. Attendance Required: Job superintendent, major Subcontractors and suppliers, Owner, Engineer, as appropriate to agenda topics for each meeting.
- E. Meeting Schedule:
  1. Project Meetings will be held monthly or as determined by the Engineer and Owner during construction.
  2. Coordinate as necessary to establish mutually acceptable schedule for meetings.
- F. Meeting Location: The Engineer will establish the meeting location, and where possible the meetings will be held at the project site or a location near the project site.
- G. Agenda:
  1. Review minutes of previous meetings.
  2. Review of Work progress.



3. Field observations, problems, and decisions.
  4. Identification of problems that impede, or will impede, planned progress.
  5. Review of submittals schedule and status of submittals.
  6. Maintenance of progress schedule.
  7. Corrective measures to regain projected schedules
  8. Planned progress during succeeding work period.
  9. Maintenance of quality and work standards.
  10. Effect of proposed changes on progress schedule and coordination.
  11. Other business relating to Work.
- H. Project Meeting minutes will be recorded and distributed within ten (10) days after meeting to participants, with three (3) copies to the Contractor and the required number of copies to the Owner, and those affected by decisions made.
- I. Revisions to Meeting Minutes:
1. Unless published minutes are challenged in writing prior to the next regularly scheduled progress meeting, the minutes will be accepted as properly stating the activities and decisions of the meeting.
  2. Individuals challenging published minutes shall reproduce and distribute copies of the challenge for review by all parties affected.
  3. Challenge to minutes shall be settled as priority portion of "old business" at the next regularly scheduled meeting.

### **3.03 CONSTRUCTION PROGRESS SCHEDULE**

- A. Submit updated schedule with each Application for Payment.

### **3.04 SUBMITTALS FOR REVIEW**

- A. When the following are specified in individual sections, submit them for review:
1. Product data.
  2. Shop drawings.
  3. Samples for selection.
  4. Samples for verification.
- B. Submit to Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.
- C. Samples
1. Provide sample or samples identical to the precise article proposed to be

provided. Identify as described under "Identification of submittals" below.

2. Number of samples required:
  - a. Unless otherwise specified, submit samples in the quantity which is required to be returned, plus one which will be retained by the Engineer.
  - b. By pre-arrangement in specific cases, a single sample may be submitted for review and, when approved, be installed in the work at a location agreed upon by the Engineer.

D. Colors and Patterns

1. Unless the precise color and pattern is specifically called out in the Contract Documents, and whenever a choice of color or pattern is available in the specified products, submit accurate color and pattern charts to the Engineer for selection and confirmation with the Owner.

- E. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below.

**3.05 SUBMITTALS FOR INFORMATION**

- A. When the following are specified in individual sections, submit them for information:

1. Design data.
2. Certificates.
3. Test reports.
4. Inspection reports.
5. Manufacturer's instructions and literature.
6. Manufacturer's field reports.
7. Other types indicated.

- B. Submit for Engineer's knowledge as contract administrator or for Owner

**3.06 SUBMITTALS FOR PROJECT CLOSEOUT**

- A. When the following are specified in individual sections, submit them at project closeout:

1. Project record documents.
2. Operation and maintenance data.
3. Warranties and Bonds.
4. Keys and Keying Schedule.
5. Spare parts and manuals.
6. Evidence of payment and release of liens per the General Conditions.

7. Section 00 65 19.13 - Contractor's Affidavit.
  8. Other types as indicated.
- B. Submit for Owner's benefit during and after project completion.

### **3.07 NUMBER OF COPIES OF SUBMITTALS**

- A. Documents for Review:
1. Shop Drawings
    - a. Scale and Measurement: Make shop drawings accurately to a scale of sufficiently large to show all pertinent aspects of the item and its method of connection to the Work.
    - b. Large Prints (11" X 17" or larger):
      - i. Submit shop drawings in the form of white copies.
      - ii. Blueprints will not be acceptable.
    - c. Manufacturer's Literature:
      - i. Where contents of submitted literature from manufacturers includes data not pertinent to the submittal, clearly show which portions of the contents are being submitted for review.
      - ii. Submit the number of copies which are required to be returned, plus three (3) copies which will be retained by the Engineer.
    - d. Do not begin fabrication of equipment or materials prior to Engineer's approval of shop drawings.
- B. Documents for Information: Submit three (3).
- C. Documents for Project Closeout: Make one (1) reproduction of submittal originally reviewed. Submit one (1) extra of submittals for information.
- D. Samples: Submit the number specified in individual specification sections; one (1) of which will be retained by Engineer.
1. After review, produce duplicates.
  2. Retained samples will not be returned to Contractor unless specifically so stated.

### **3.08 SUBMITTAL PROCEDURES**

- A. Transmit each submittal with a Cover Letter that stipulates that the items submitted comply or do not comply with the full extent of the specifications. The Cover Letter must also include an explanation of why the items submitted are considered equal to the items specified. Failure to submit a Cover Letter will result in a rejection of the submittal.

- B. Timing of Submittals:
1. Within fifteen (15) calendar days after the Contractor has received the Owner's notice to proceed, submit:
    - a. Schedule for submittals including specification section, type of submittal and submittal date.
    - b. Construction schedule.
    - c. Schedule of partial payment requests.
  2. Make submittals of shop drawings, samples, substitution requests and other items in accordance with the provisions of this Section.
- C. Quality Assurance:
1. Coordination of submittals:
    - a. Prior to each submittal, carefully review and coordinate all aspects of each item being submitted.
    - b. Verify that each item and the submittal for it conform in all respects with the specified requirements.
    - c. By affixing the Contractor's signature to each submittal, certify that this coordination has been performed.
  2. The following products do not require further approval except for interface within the Work and where otherwise indicated.
    - a. Products specified by reference to standard specifications such as ASTM, AWWA, and similar standards.
    - b. Products specified by manufacturer's name and catalog model number.
  3. Or equal:
    - a. Where the phrase "or equal" occurs in the Contract Documents, do not assume that the materials, equipment or methods will be considered as equal unless the item has been specifically so approved for this Work by the Engineer.
    - b. The decision of the Engineer shall be final.
  4. The Engineer shall assume that no shop drawing or related submittal comprises a variation unless the Contractor advises the Engineer otherwise in writing.
- D. Sequentially number submittal in the Cover Letter. Revise submittals with original number and a sequential alphabetic suffix.
- E. Before submitting a shop drawing or any related material, Contractor shall:

1. Review each such submission for conformance with the means, methods, techniques, sequences, and operations of construction, and safety precautions and programs incidental thereto, all of which are the sole responsibility of Contractor.
  2. Approve each such submission before submitting it.
  3. Stamp each such submission before submitting it.
- F. Shop drawings and related materials shall be returned with comments provided that each submission has been specified and is stamped by the Contractor.
- G. Shop drawings or material not specified or which have not been approved by the Contractor shall be returned without comment.
- H. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work and coordination of information is in accordance with the requirements of the Work and Contract Documents. The following stamp shall be used on all shop drawings: "This Shop Drawing has been reviewed by [Name of Contractor] and approved in accordance with the ways, means, methods, techniques, sequences and procedures associated with the project construction. [Name of Contractor] has approved these Shop Drawings in accordance with safety precautions and programs incidental thereto, and warrants that these Shop Drawings comply with the Contract Documents and includes no variations from the specifications."

Signature  
Name and Title (Please Print)  
Date

- I. Identification of Submittals
1. Consecutively number all submittals.
    - a. When material is resubmitted for any reason, transmit under a new letter of transmittal and with a new transmittal number.
    - b. On resubmittals, cite the original submittal number for reference.
  2. Accompany each submittal with a letter of transmittal showing all information required for identification and checking.
  3. On at least the first page of each submittal, and elsewhere as required for positive identification, show the submittal number in which the item was included.
  4. Maintain an accurate submittal log for the duration of the work, showing current status of all submittals at all times. Make the submittal log available to the Engineer for his review upon request.
- J. Unrequired submittals will not be reviewed by the Engineer.
- K. Submittals required by the Contractor of his subcontractors, such as drawings, setting diagrams or similar information needed to coordinate the construction, shall remain between the Contractor and his subcontractors and these submittals will not be reviewed by the Engineer.

L. Grouping of Submittals

1. Unless otherwise specified, make submittals in groups containing all associated items to assure that information is available for checking each item when it is received.
  - a. Partial submittals may be rejected as not complying with the provisions of the Contract.
  - b. The Contractor may be held liable for delays so occasioned.

M. Timing of Submittals

1. Make submittals far enough in advance of scheduled dates for installation to provide time required for reviews, for securing necessary approvals, for possible revisions and resubmittals, and for placing orders and securing delivery.

N. Resubmittal Schedule

1. For submittals marked "Furnish as Corrected" by the Engineer, resubmittal shall be within fifteen (15) days of the review date shown on the Engineer's shop drawing review stamp.
2. For submittals marked "Revise and Resubmit", "Submit Specified Item", or "Rejected", resubmittal shall be within fifteen (15) days of the review date shown on the Engineer's shop drawing review stamp.

O. Engineer's Review

1. Review by the Engineer does not relieve the Contractor from responsibility for errors which may exist in the submitted data.
2. Revisions:
  - a. Make revisions required by the Engineer.
    - i. If the Contractor considers any required revision to be a change, he shall so notify the Engineer as provided for in the General Conditions.
    - ii. Make only those revisions directed or approved by the Engineer.
    - iii. Submittals which have been reviewed and returned to the Contractor marked "Revise and Resubmit" or "Rejected" and which are resubmitted and not in an approved state, will not be reviewed a third time unless payment for the third and any subsequent review is by the Contractor. The engineering costs for review shall be equal to the Engineer's charges to the Owner under the terms of the Engineering Agreement with the Owner.

P. Deliver submittals to Engineer at business address.

Q. Schedule submittals to expedite the Project, and coordinate submission of related items.

R. For each submittal for review, allow twenty-five (25) working days excluding delivery time to and from the Contractor.

- S. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.
- T. Provide space for Contractor and Engineer review stamps.
- U. When revised for resubmission, identify all changes made since previous submission.
- V. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.
- W. Submittals not requested will not be recognized or processed.

**END OF SECTION**

## SECTION 01 31 00

### CONSTRUCTION SCHEDULES

#### PART 1 GENERAL

##### 1.01 DESCRIPTION

- A. Work included: Construction Schedules are to be prepared to provide assurance of project planning and the execution of the work so that the construction is completed within the construction period as stated in the Contract Documents, and to provide Alliance Consulting Engineers, Inc. a means to evaluate the progress of the work.
- B. Related work:
  - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, and Sections in Division 01 of these Specifications.
  - 2. General Conditions and the requirements associated with the progress schedule.
  - 3. Construction period: As related to the executed contract.
- C. Definitions: "Day", means calendar day.

##### 1.02 QUALITY ASSURANCE

- A. The Contractor is to provide a scheduler that is thoroughly trained and experienced in preparing construction schedule data, and in preparing and issuing periodic schedule reports as stated below.
- B. Perform data preparation that includes analysis, charting and updating as required.
- C. Reliance upon the approved schedule:
  - 1. Once approved by Alliance Consulting Engineers, Inc., the construction schedule will be an integral part of the Contract and will establish interim completion dates for the various construction tasks specified in the Contract.
  - 2. The Contractor agrees and understands that the failure of the Owner to exercise this option either to order the Contractor to expedite an activity or to expedite the activity by other means shall not be considered a precedent for any other scheduled activities.

##### 1.03 SUBMITTALS

- A. Comply with provisions of Section 01 30 00 Administrative Requirements.
- B. Once the preliminary schedule has been reviewed and approved by Alliance Consulting Engineers, Inc., within ten (10) calendar days, the Contractor must submit one (1) reproducible copy and four (4) prints of a preliminary construction schedule prepared in accordance with Part 3 of this Section.

### CONSTRUCTION SCHEDULES

01 31 00-1



- C. Once the Contractor receives final review and approval of the preliminary construction schedule, the Contractor must submit within ten (10) calendar days one (1) reproducible copy and four (4) prints of a construction schedule prepared in accordance with Part 3 of this Section.
- D. The Contractor must also provide on the first working day of each month, four (4) prints of the construction schedule that has been updated in accordance with Part 3 of this Section.

## **PART 2 PRODUCTS**

### **2.01 CONSTRUCTION ANALYSIS**

- A. The construction schedule must illustrate graphically by bar chart the order and interdependence of all construction activities required to complete the work, and the sequence in which the construction activities are to be completed. All construction activities must be planned by the Contractor and his project field superintendent in coordination with all subcontractors whose work is shown on the diagram and any other work being completed on the project site by other contractors that requires coordination.
  - 1. The graphical chart must be a two (2) line bar chart; with one (1) bar for planned activities, and one (1) bar for actual activity completion.
- B. Include, but do not necessarily limit indicated activities to:
  - 1. Project mobilization.
  - 2. Submittal and approval of shop drawings and sample data.
  - 3. Procurement of equipment and critical materials.
  - 4. Fabrication of special material and equipment, and its installation and testing.
  - 5. Each construction activity that is critical to the work being performed.
  - 6. All activities by Alliance Consulting Engineers, Inc. that affect progress, required dates for completion, or both, for all and each part of the Work.
  - 7. All activities by other contractors that have to be coordinated with the work being completed under this Contract.
  - 8. Final cleanup.
  - 9. Final inspecting and testing.

## **PART 3 EXECUTION**

### **3.01 PRELIMINARY ANALYSIS**

- A. Contents:
  - 1. Outline the activities of the Contractor for the period between receipt of Notice to Proceed and submittal of construction schedule.

2. Outline the Contractor's approach to the remaining work to be completed.
3. Outline the costs of all activities scheduled before submittal and approval of the construction schedule.

### **3.02 CONSTRUCTION SCHEDULE**

- A. Provide a construction schedule that incorporates all of the revisions from review of the preliminary analysis.

### **3.03 PERIODIC REPORTS**

- A. Provide monthly updates of the approved construction schedule.
  1. Indicate "actual" progress for each activity on the bar chart.
  2. Provide written narrative summary of revisions causing delay in the construction, and an explanation of corrective actions being taken or proposed.

### **3.04 REVISIONS**

- A. Provide a revised construction schedule periodically that includes delays, early completion, etc.
- B. Any revisions to the construction schedule must be approved by Alliance Consulting Engineers, Inc. before acceptance.

**END OF SECTION**

## SECTION 01 32 00

### PROJECT CONSTRUCTION SEQUENCE AND PROVISIONS

#### PART 1 GENERAL

##### 1.01 CONSTRUCTION AREAS

- A. The Contractor shall limit his use of the construction areas for work and for storage to allow for:
  - 1. Work by other Contractors.
  - 2. Owner use.
  - 3. Public use.
- B. Coordinate use of work site under direction of Engineer.
- C. Assume full responsibility for the protection and safekeeping of materials and products under this Contract, stored on the site.
- D. Move any stored products, under Contractor's control, which interfere with operations of the OWNER or separate Contractor.
- E. Obtain and pay for the use of additional storage of work areas needed for operations.

##### 1.02 SPECIFICATIONS

- A. Specifications

The Technical Specifications consist of three parts: General, Products and Execution. The General Section contains General Requirements which govern the work. Products and Execution modify and supplement these by detailed requirements of the work and shall always govern whenever there appears to be a conflict.

- B. Intent

All work called for in the Specifications applicable to this Contract, but not shown on the plans in their present form, or vice versa, shall be of like effect as if shown or mentioned in both. Work not specified in either the plans or the Specifications, but involved in carrying out their intent or in the complete and proper execution of the work is required and shall be performed by the Contractor as though it were specifically delineated or described.

The apparent silence of the specifications as to any detail, or the apparent omission from them of a detailed description concerning any work to be done and materials to be furnished, shall be regarded as meaning that only the best general practice is to prevail and that only material and workmanship of the best quality is to be used, and interpretation of these specifications shall be made upon that basis. The inclusion of the General Requirements (or work specified elsewhere) in the General part of the specifications is only for the convenience of the Contractor, and shall not be interpreted as a complete list of related Specification Sections.

##### 1.03 WORK IN PROGRESS

The Contractor shall furnish personnel and equipment which will be efficient, appropriate, and adequately sized to secure a satisfactory quality of work and a rate of progress which will insure the completion of the work within the time stipulated in the Proposal. If at any time such personnel

appears to the Engineer to be inefficient, inappropriate, or insufficient for securing the quality of work required for producing the rate of progress aforesaid, he may order the Contractor to increase the efficiency, change the character, or increase the personnel and equipment, and the Contractor shall conform to such order. Failure of the Engineer to give such order shall in no way relieve the Contractor of his obligations to secure the quality of the work and rate of progress required.

#### **1.04 UTILITY SYSTEMS AND FACILITIES**

- A. The Contractor shall interrupt water, telephone, power, cable TV, sewer, gas or other related utility services and disturb the normal functioning of the system as little as possible. He shall notify the Engineer and the appropriate agency well in advance of any requirements for dewatering, isolating, or relocating a section of a utility, so that necessary arrangements may be made with the appropriate agency.
- B. The Contractor shall assume full responsibility for the protection of all buildings, structures, and utilities, public or private, including poles, signs, services to buildings, utilities in the street, gas pipes, water pipes, hydrants, sewers, storm drains and electric and telephone cables, whether or not they are shown on the Drawings. The Contractor shall carefully support and protect all such structures and utilities from injury of any kind. Any damage resulting from the Contractor's operations shall be repaired by him/her at his/her expense.
- C. The Contractor shall bear full responsibility for obtaining locations of all underground structures and utilities (including existing water services, drain lines, and sewers). Services to buildings shall be maintained, and all costs or charges resulting from damage thereto shall be paid by the Contractor.
- D. Protection and temporary removal and replacement of existing utilities and structures as described in this Section shall be a part of the work under the Contract and no separate payment will be made for this work.
- E. If, in the opinion of the Engineer, permanent relocation of a utility owned by the Owner is required, he may direct the Contractor in writing, to perform the work. Work so ordered will be paid for at the contract unit prices, if applicable, or as extra work. If relocation of a privately owned utility is required, the Owner will notify the utility to perform the work as expeditiously as possible. The Contractor shall fully cooperate with the Owner and utility and shall have no claim for delay due to such relocation. The Contractor shall notify all utility companies in writing at least 48 hours (excluding Saturdays, Sundays, and legal holidays) before excavating near their utilities.
- F. The Contractor shall be responsible to maintain water, telephone, power, cable TV, sewer, gas and other related utilities throughout construction at no additional cost to the Owner.
- G. The Contractor shall fully cooperate with all private and public utilities during the installation of new facilities, or relocation of existing facilities. The Contractor shall coordinate his work accordingly and shall have no claim except for time extension for delays associated with the proposed utility improvements.

#### **1.05 TEST PITS**

- A. Test pits for the purpose of locating underground pipeline or structures in advance of the construction shall be excavated and backfilled by the Contractor at the direction of the Engineer. Test pits shall be backfilled immediately after their purpose has been satisfied and the surface restored and maintained in a manner satisfactory to the Engineer. No separate payment will be made.

## **1.06 CARE AND PROTECTION OF PROPERTY**

- A. The Contractor shall be responsible for the preservation of all public and private property, and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work on the part of the Contractor, such property shall be restored by the Contractor, at his expense, to a condition similar or equal to that existing before the damage was done, or he shall make good the damage in another manner acceptable to the Engineer.
- B. All sidewalks and driveways which are disturbed by the Contractor's operations shall be restored to their original or better condition by the use of similar or comparable materials.
- C. Along the location of this work all fences, walks, bushes, trees, shrubbery, and other physical features shall be protected and restored in a thoroughly workmanlike manner. Fences and other features removed by the Contractor shall be replaced in the location indicated by the Engineer as soon as conditions permit. All grass areas beyond the limits of construction which have been damaged by the Contractor shall be regraded and seeded.
- D. Trees close to the work shall be boxed or otherwise protected against injury. The Contractor shall trim all branches that are liable to damage because of his operations, but in no case shall any tree be cut or removed without prior notification of the tree warden. All injuries to bark, trunk, limbs, and roots of trees shall be repaired by dressing, cutting, and painting according to approved methods, using only approved tools and materials.
- E. The protection, removal, and replacement of existing physical features along the line of work shall be a part of the work under the Contract, and all costs in connection therewith shall be included in the unit and/or lump sum prices established under other items in the Proposal.

## **1.07 CLEAN-UP**

- A. During the course of the work, the Contractor shall keep the site of his operations in as clean and neat of a condition as is possible. He shall dispose of all residue resulting from the construction work and, at the conclusion of the work, he shall remove and haul away any surplus excavation, broken pavement, brick, lumber, equipment, temporary structures, and any other refuse remaining from the construction operations, and shall leave the entire site of the work in a neat and orderly condition.
- B. In order to prevent environmental pollution arising from the construction activities related to the performance of this Contract, the Contractor and his/her subcontractors shall comply with all applicable Federal, State and local laws and regulations concerning waste material disposal, as well as the specific requirements stated in this Section and elsewhere in the Specifications.
- C. The Contractor is advised that the disposal of excess excavated material in wetlands, stream corridors and plains is strictly prohibited even if the permission of the property owner is obtained. Any violation of this restriction by the Contractor or any person employed by him, will be brought to the immediate attention of the responsible regulatory agencies, with a request that appropriate action be taken against the offending parties. The Contractor will be responsible to pay all fines, remove the fill, and restore the area impacted.

## **1.08 PROTECTION OF CONSTRUCTION AND EQUIPMENT**

- A. All newly constructed work shall be carefully protected from injury in any way. No wheeling or walking or placing of heavy loads on it shall be allowed and all portions injured shall be reconstructed by the Contractor at his own expense.

- B. All structures shall be protected in a manner approved by the Engineer. Should any of the structures become heaved, cracked, or otherwise damaged, all such damaged portions of the work shall be completely repaired and made good by the Contractor, at his own expense, and to the satisfaction of the Engineer. If, in the final inspection of the work, any defects, faults, or omissions are found, the Contractor shall cause the same to be repaired or removed and replaced by proper materials and workmanship without extra compensation for the materials and labor required. Further, the Contractor shall be fully responsible for the satisfactory maintenance and repair of the construction and other work undertaken herein, for at least the guarantee period described in the Contract.
  
- C. Further, the Contractor shall take all necessary precautions to prevent damage to any structure due to water pressure during and after construction and until such structure is accepted and taken over by the Owner.

### **1.09 PROJECT SEQUENCING**

Construct work in stages to accommodate operation of existing facilities during construction period. Coordinate construction schedule and operations with the Owner and the Engineer. Owner reserves the right to place facilities, taken out of service by Contractor, back into service on emergency basis upon notification to Contractor.

**PART 2 PRODUCTS – NOT USED**

**PART 3 EXECUTION – NOT USED**

**END OF SECTION**

## SECTION 01 40 00

### QUALITY REQUIREMENTS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. References and standards.
- B. Quality assurance submittals
- C. Control of installation.
- D. Inspection services.
- E. Cooperate with the Owner's selected testing agency and all others responsible for testing and inspecting the work.
- F. Provide such other testing and inspecting as are specified to be furnished by the Contractor in this Section and/or elsewhere in the Contract Documents.

##### 1.02 RELATED REQUIREMENTS

- A. Section 01 30 00 - Administrative Requirements: Submittal procedures.
- B. Section 01 60 00 - Product Requirements: Requirements for material and product quality.
- C. Requirements for testing may be described in various Sections of these specifications.
- D. Where no testing requirements are described, but the Owner decides that testing is required, the Owner may require such testing to be performed under current pertinent standards for testing. Payment for such testing will be made as described in this Section.

##### 1.03 ADDITIONAL WORK INCLUDED:

- A. Selection of testing laboratory: The contractor shall provide all necessary testing by a prequalified independent testing laboratory. This information shall be provided to the Engineer for approval during the shop drawing review process.
- B. Payment for initial testing: The selected contractor's contract shall provide all necessary services of the testing laboratory within the contract prices to the owner as further described in Article 2.1 of this Section.
- C. Tests at point of manufacture as specified in other Sections of these documents are to be made with all costs borne by the Contractor.

##### 1.04 REFERENCE STANDARDS

- A. ASTM C 1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation; 2009.

- B. ASTM D 3740 - 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; 2008.
- C. ASTM E 329 - Standard Specification for Agencies Engaged Construction Inspection and/or Testing; 2009.

#### **1.05 SUBMITTALS**

- A. Testing Agency Qualifications:
  - 1. Prior to start of Work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
- B. Test Reports: After each test/inspection, promptly submit three (3) copies of report to Alliance Consulting Engineers, Inc. and to Owner.
  - 1. Include:
    - a. Date issued.
    - b. Project title and number
    - c. Name of inspector
    - d. Date and time of sampling or inspection
    - e. Identification of product and specifications section
    - f. Location in the Project
    - g. Type of test/inspection
    - h. Date of test/inspection
    - i. Results of test/inspection
    - j. Conformance with Contract Documents
    - k. When requested by Alliance Consulting Engineers, Inc., provide interpretation of results.
  - 2. Test report submittals are for Alliance Consulting Engineers Inc.'s knowledge as contract administrator for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents, or for Owner information
- C. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Alliance Consulting Engineers, Inc., in quantities specified for Product Data.
  - 1. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
  - 2. Certificates may be recent or previous test results on material or product, but must be acceptable to Alliance Consulting Engineers, Inc.



- D. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

## **1.06 REFERENCES AND STANDARDS**

- A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.
- C. Obtain copies of standards where required by product specification sections.
- D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.
- E. Should specified reference standards conflict with Contract Documents, request clarification from Alliance Consulting Engineers, Inc. before proceeding.
- F. Neither the contractual relationships, duties, nor responsibilities of the parties in Contract nor those of Alliance Consulting Engineers, Inc. shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

## **1.07 QUALITY ASSURANCE**

- A. The testing laboratory will be qualified to the Owner's approval in accordance with ASTM E 329.
- B. Testing, when required, will be in accordance with all pertinent codes and regulations, and with selected standards of the American Society for Testing and Materials.

## **1.08 PRODUCT HANDLING**

- A. Comply with pertinent provisions of Section 01 60 00 Product Requirements.
- B. Promptly process and distribute required copies of test reports and related instructions to assure necessary retesting and replacement of materials with the least possible delay in progress of the work.

## **PART 2 PRODUCTS**

### **2.01 PAYMENT FOR TESTING**

- A. Testing Services:
  - 1. The Contractor will pay for all testing services required by the contract documents and manufacturer's recommendations except for aggregate and compaction testing.
  - 2. When initial tests indicate non-compliance with the Contract Documents, any all

retesting and consulting required to provide compliance with the Contract Documents will be the responsibility of the contractor at no additional costs to the Owner.

3. Retesting: When initial tests indicate non-compliance with the Contract Documents, subsequent re-testing occasioned by the non-compliance shall be performed by the same testing agency.

## **2.02 CODE COMPLIANCE TESTING**

- A. Inspections and tests required by codes or ordinances, or by a plan approval authority, and which are made by a legally constituted authority, shall be the responsibility of and shall be paid for by the Contractor, unless otherwise provided in the Contract Documents.

## **2.03 CONTRACTOR'S CONVENIENCE TESTING**

- A. Inspecting and testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor.

## **PART 3 EXECUTION**

### **3.01 CONTROL OF INSTALLATION**

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Alliance Consulting Engineers, Inc. before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have Work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

### **3.02 CONTRACTOR TESTING COORDINATION:**

- A. Cooperation with Testing Laboratory:
  1. Representatives of the testing laboratory shall have access to the work at all times and at all locations where the work is in progress. Provide facilities for such access to enable the laboratory to perform its functions properly.
- B. Taking Specimens:
  1. All specimens and samples for testing, and deliveries to laboratory, unless

otherwise provided in the Contract Documents, shall be taken by the testing personnel. All sampling equipment and personnel will be provided by the testing laboratory. All deliveries of specimens and samples to the testing laboratory will be performed by the testing laboratory.

### **3.03 SCHEDULES FOR TESTING**

- A. Establishing schedule:
  - 1. By advance discussion with the testing laboratory selected by the Owner, determine the time required for the laboratory to perform its tests and to issue each of its findings.
  - 2. Provide all required time within the construction schedule.
- B. Revising schedule: When changes of construction schedule are necessary during construction, coordinate all such changes with the testing laboratory as required.
- C. Adherence to schedule: When the testing laboratory is ready to test according to the established schedule, but is prevented from testing or taking specimens due to incompleteness of the work, all extra charges for testing attributable to the delay may be back-charged to the Contractor and shall not be borne by the Owner.

### **3.04 TESTING AND INSPECTION**

- A. Testing Agency Duties:
  - 1. Provide qualified personnel at site. Cooperate with Alliance Consulting Engineers, Inc. and Contractor in performance of services.
  - 2. Perform specified sampling and testing of products in accordance with specified standards.
  - 3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
  - 4. Promptly notify Alliance Consulting Engineers, Inc. and Contractor of observed irregularities or non-conformance of Work or products.
  - 5. Perform additional tests and inspections required by Alliance Consulting Engineers, Inc.
  - 6. Submit reports of all tests/inspections specified.
- B. Limits on Testing/Inspection Agency Authority:
  - 1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
  - 2. Agency may not approve or accept any portion of the Work.
  - 3. Agency may not assume any duties of Contractor.
  - 4. Agency has no authority to stop the Work.

- C. Contractor Responsibilities:
  - 1. Provide incidental labor and facilities:
    - a. To provide access to Work to be tested/inspected
    - b. To facilitate tests/inspections
  - 2. Notify Alliance Consulting Engineers, Inc. and laboratory twenty-four (24) hours prior to expected time for operations requiring testing/inspection services.
  - 3. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
  - 4. Arrange with the Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- D. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Alliance Consulting Engineers, Inc.
- E. Re-testing required because of non-conformance to specified requirements shall be paid for by Contractor.
- F. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Alliance Consulting Engineers, Inc. Payment for re-testing will be charged to the Contractor by deducting testing charges from the Contract Price.

### **3.05 DEFECT ASSESSMENT**

- A. Replace Work or portions of the Work not conforming to specified requirements.
- B. If, in the opinion of Alliance Consulting Engineers, Inc., it is not practical to remove and replace the Work, Alliance Consulting Engineers, Inc. will direct an appropriate remedy or adjust payment.

**END OF SECTION**

## SECTION 01 41 26

### PERMITS AND RIGHTS-OF-WAY

#### PART 1 GENERAL

##### 1.01 DESCRIPTION

- A. Work included: This section outlines the requirements of the Contractor for the payment for any fees and the acquisition of any required licenses, building permits, rights-of-ways, easements, etc., that may be required for the construction of the project.
- B. Work not included: The Owner will obtain and provide to the Contractor, copies of the following, if required:
  - 1. South Carolina Department of Health and Environmental Control, Permit to Construct.
- C. Related work: Documents affecting work of this section include, but are not necessarily limited to, General Conditions and Sections in Division 01 of these specifications.

##### 1.02 SUBMITTALS

- A. Submit to the Engineer and post at the site, satisfactory evidence that all required licenses, building permits, etc., have been obtained prior to start of construction.

#### PART 2 PRODUCTS - NOT USED

#### PART 3 EXECUTION

##### 3.01 BUSINESS LICENSE

- A. Verify licenses that are required to perform the work within the project area, and obtain at no additional cost to the Owner.

##### 3.02 RIGHTS-OF-WAY, UTILITY LINES

- A. The Contractor shall confine his activities to the project limits as illustrated in the Contract Documents.
- B. The Owner will provide no right-of-way over other property.

##### 3.03 LAND

- A. The necessary land for construction of the proposed improvements will be provided by the Owner.

**END OF SECTION**

## SECTION 01 42 19

### REFERENCE STANDARDS

#### PART 1 GENERAL

##### 1.01 DESCRIPTION

- A. Throughout these Contract Documents, references are made to specifications and standards that have been issued by nationally recognized professional and/or trade organizations. These referenced standards are generally identified by abbreviating the name of the organization following with the specification/standard number, and unless specifically indicated otherwise, all references to standards refer to the latest edition available at the time of the bidding.

##### 1.02 ABBREVIATIONS

- A. Wherever the following abbreviations are used in these Contract Documents, these abbreviations are to be considered as the same as the respective expressions represented below:

1.	AASHO	American Association of State Highway Officials
2.	ACI	American Concrete Institute
3.	AISC	American Institute of Steel Construction
4.	ALS	American Lumber Standards
5.	ANSI	American National Standards Institute, Inc.
6.	ASTM	American Society for Testing and Materials
7.	AWWA	American Water Works Association
8.	AWPA	American Wood Preservers Association
9.	AWS	American Welding Society
10.	FSS	Federal Specifications and Standards, General Services Administration
11.	SPIB	Southern Pine Inspection Bureau
12.	SSPC	Steel Structures Painting Council

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**

## SECTION 01 45 29

### TESTING LABORATORY SERVICES

#### PART 1 GENERAL

##### 1.01 SCOPE

- A. This Section includes testing which the Owner may require, beyond that testing required of the manufacturer, to determine if materials provided for the Project meet the requirements of these Specifications.
- B. This work also includes all testing required by the Owner to verify work performed by the Contractor is in accordance with the requirements of these Specifications, i.e., concrete strength and slump testing, soil compaction, etc.
- C. This work does not include materials testing required in various sections of these Specifications to be performed by the manufacturer, e.g., testing of pipe.

##### 1.02 SECTION INCLUDES

- A. Selection of Testing Laboratory.
- B. Laboratory Duties.
- C. Payment for Testing Services.
- D. Contractor Responsibilities.
- E. Schedules for Testing.
- F. Transporting Samples.

##### 1.03 SELECTION OF TESTING LABORATORY

The testing laboratory or laboratories will be selected by the Contractor, subject to the approval of the Owner.

##### 1.04 LABORATORY DUTIES

- A. Cooperate with the Owner, Engineer and Contractor.
- B. Provide qualified personnel promptly on notice.
- C. Perform specified inspections, sampling and testing of materials.
  - 1. Comply with specified standards, ASTM, other recognized authorities, and as specified.
  - 2. Ascertain compliance with requirements of the Contract Documents.
- D. Promptly notify the Engineer and Contractor of irregularity or deficiency of work which are observed during performance of services.
- E. Promptly submit three copies (two copies to the Engineer and one copy to the Contractor) of report of inspections and tests in addition to those additional copies required by the Contractor with the following information included:

1. Date issued
  2. Project title and number
  3. Testing laboratory name and address
  4. Name and signature of inspector
  5. Date of inspection or sampling
  6. Record of temperature and weather
  7. Date of test
  8. Identification of product and Specification section
  9. Location of Project
  10. Type of inspection or test
  11. Results of test
  12. Observations regarding compliance with the Contract Documents
- F. Perform additional services as required.
- G. The laboratory is not authorized to release, revoke, alter or enlarge on requirements of the Contract Documents, or approve or accept any portion of the Work.

#### **1.05 PAYMENT FOR TESTING SERVICES**

- A. The cost of testing services required by the Contract shall be paid for by the Contractor and shall be included in the cost of the work to which it pertains. This excludes concrete, soil and asphalt testing, which will be paid for by the Owner.
- B. The cost of additional testing services not specifically required in the Specifications, but requested by the Owner or Engineer, shall be paid for by the Owner.
- C. The cost of material testing described in various sections of these Specifications or as required in referenced standards to be provided by a material manufacturer, shall be included in the price bid for that item and shall not be paid for by the Owner.
- D. The cost of retesting any item that fails to meet the requirements of these Specifications shall be paid for by the Contractor.

#### **1.06 CONTRACTOR RESPONSIBILITIES**

- A. Contractor will be furnished contact information for the selected laboratory. Contractor will be required to schedule ALL testing.
- B. Cooperate with laboratory personnel, provide access to Work and/or manufacturer's requirements.
- C. Provide to the laboratory, representative samples, in required quantities, of materials to be tested.
- D. Furnish copies of mill test reports.



- E. Furnish required labor and facilities to:
  - 1. Provide access to Work to be tested;
  - 2. Obtain and handle samples at the site (if certified to do so);
  - 3. Facilitate inspections and tests;
  - 4. Build or furnish a holding box for concrete cylinders or other samples as required by the laboratory.
- F. Notify the laboratory sufficiently in advance of operation to allow for the assignment of personnel and schedules of tests.
- G. Laboratory Tests: Where such inspection and testing are to be conducted by an independent laboratory agency, the sample(s) shall be selected by such laboratory or agency, or the Engineer, and shipped to the laboratory by the Contractor at Contractor's expense.
- H. Copies of all correspondence between the Contractor and testing agencies shall be provided to the Engineer.
- I. If the Contractor disagrees with the approved Engineer's testing agency's methods or results during an onsite test, the Contractor may have another testing agency conduct an independent evaluation at the Contractor's expense. After an independent evaluation is performed, the Contractor will submit their results to the Engineer for review.

#### **1.07 SCHEDULES FOR TESTING**

- A. Establishing Schedule
  - 1. The Contractor shall, by advance discussion with the testing laboratory, determine the time required for the laboratory to perform its tests and to issue each of its findings, and make all arrangements for the testing laboratory to be on site to provide the required testing.
  - 2. Provide all required time within the construction schedule.
- B. When changes of construction schedule are necessary during construction, coordinate all such changes of schedule with the testing laboratory as required.
- C. When the testing laboratory is ready to test according to the determined schedule, but is prevented from testing or taking specimens due to incompleteness of the Work, all extra costs for testing attributable to the delay will be back-charged to the Contractor and shall not be borne by the Owner.

#### **1.08 TRANSPORTING SAMPLES**

The Contractor shall be responsible for transporting all samples, except those taken by testing laboratory personnel, to the testing laboratory.

#### **PART 2 PRODUCTS - NOT USED**

#### **PART 3 EXECUTION - NOT USED**

**END OF SECTION**

## SECTION 01 50 00

### TEMPORARY FACILITIES AND CONTROLS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Vehicular access and parking.

##### 1.02 RELATED SECTIONS

- A. Section 01 55 10 - Vehicular Access and Parking

##### 1.03 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.
- C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

##### 1.04 VEHICULAR ACCESS AND PARKING - See Section 01 55 10

- A. Coordinate access and haul routes with governing authorities and Owner.
- B. Provide and maintain access to fire hydrants, free of obstructions.
- C. Provide means of removing mud from vehicle wheels before entering streets.
- D. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

##### 1.05 PROJECT IDENTIFICATION – NOT USED

##### 1.06 FIELD OFFICES

Contractor is allowed to locate a construction trailer on site for the contractor's office use as needed. The power and waste will be contractor's responsibility. The removal of the facility will be required by the contractor before the project is completed at the contractor's expense.

#### PART 2 PRODUCTS - NOT USED

#### PART 3 EXECUTION - NOT USED

END OF SECTION

**SECTION 01 55 10**

**VEHICULAR ACCESS AND PARKING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Access roads.
- B. Parking.
- C. Maintenance

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Temporary Construction: Per Detail on Plans

**PART 3 EXECUTION**

**3.01 PREPARATION**

- A. Clear areas, provide surface and storm drainage of road, parking, area premises, and adjacent areas

**3.02 ACCESS ROADS**

- A. All material shall be delivered to the site by use of the temporary construction entrance from Mid-Carolina Court (County owned roadway).

**3.03 PARKING**

- A. Locate as approved by Owner/Engineer along Mid-Carolina Court.

**3.04 MAINTENANCE**

- A. Maintain traffic and parking areas in a sound condition free of excavated material, construction equipment, products, mud, snow, and ice.
- B. Maintain existing paved areas used for construction. Promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.

**3.05 REMOVAL, REPAIR**

- A. Remove equipment and devices when no longer required.
- B. Repair damage caused by installation.

**3.06 MUD FROM SITE VEHICLES**

- A. Provide means of removing mud from vehicle wheels before entering streets.

**END OF SECTION**

**SECTION 01 60 00**  
**PRODUCT REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. General product requirements.
- B. Re-use of existing products.
- C. Transportation, handling, storage and protection.
- D. Product option requirements.
- E. Substitution limitations and procedures.
- F. Maintenance materials, including extra materials, spare parts, tools, and software.
- G. Protect products scheduled for use in the work by means including, but not necessarily limited to, those described in this Section.

**1.02 RELATED REQUIREMENTS**

- A. Document 00 21 13 - Instructions to Bidders: Product options and substitution procedures prior to bid date.
- B. Section 01 40 00 - Quality Requirements: Product quality monitoring.
- C. Documents affecting work of this Section include, but are not necessarily limited to, Standard General Conditions of the Construction Contract and Sections in Division 01 of these specifications.
- D. Additional procedures also may be prescribed in other Sections of these specifications.

**1.03 SUBMITTALS**

- A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
  - 1. Submit within fifteen (15) days after date of Agreement.
  - 2. For products specified only by reference standards, list applicable reference standards.
- B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- C. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

- D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
  - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.
- E. Indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

#### **1.04 QUALITY ASSURANCE**

- A. Include within the Contractor's quality assurance program such procedures as are required to assure full protection of work and materials.

#### **1.05 MANUFACTURER'S RECOMMENDATIONS**

- A. Except as otherwise approved by the Engineer, determine and comply with manufacturer's recommendations on product handling, storage and protection.

### **PART 2 PRODUCTS**

#### **2.01 EXISTING PRODUCTS**

- A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by the Contract Documents.
- B. Unforeseen historic items encountered remain the property of the Owner; notify the Owner promptly upon discovery; protect, remove, handle, and store as directed by the Owner.
- C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.
- D. Reused Products: Reused products include materials and equipment previously used in this or other construction, salvaged and refurbished as specified.

#### **2.02 NEW PRODUCTS**

- A. Provide new products unless specifically required or permitted by the Contract Documents.

#### **2.03 PRODUCT OPTIONS**

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

## **2.04 MAINTENANCE MATERIALS**

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver to Project site; obtain receipt prior to final payment.

## **PART 3 EXECUTION**

### **3.01 SUBSTITUTION PROCEDURES**

- A. Instructions to Bidders specify time restrictions for submitting requests for substitutions during the bidding period. Comply with requirements specified in this section.
- B. Alliance Consulting Engineers, Inc. will consider requests for substitutions only within fifteen (15) days after date of Agreement.
- C. Document each request with complete data substantiating compliance of proposed substitution with Contract Document
- D. A request for substitution constitutes a representation that the submitter:
  - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
  - 2. Will provide the same warranty for the substitution as for the specified product.
  - 3. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
  - 4. Waives claims for additional costs or time extension that may subsequently become apparent.
  - 5. Will reimburse the Owner and Alliance Consulting Engineers, Inc. for review or redesign services associated with re-approval by authorities.
- E. Substitution Submittal Procedure:
  - 1. Submit three (3) copies of request for substitution for consideration. Limit each request to one proposed substitution.
  - 2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
  - 3. Alliance Consulting Engineers, Inc. will notify Contractor in writing of decision to accept or reject request.

### **3.02 PACKAGING**

- A. Deliver products to the job site in their manufacturer's original container, with labels intact and legible.
  - 1. Maintain packaged materials with seals unbroken and labels intact until time of use.
  - 2. Promptly remove damaged material and unsuitable items from the job site and

promptly replace with material meeting the specified requirements, at no additional cost to the Owner.

- B. The Engineer may reject as non-complying such material and products that do not bear identification satisfactory to the Engineer as to manufacturer, grade, quality and other pertinent information.

### **3.03 TRANSPORTATION AND HANDLING**

- A. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- B. Transport and handle products in accordance with manufacturer's instructions.
- C. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- D. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- E. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.
- F. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

### **3.04 STORAGE AND PROTECTION**

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- G. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- H. Prevent contact with material that may cause corrosion, discoloration, or staining.
- I. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- J. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

- K. Partial payments under the Contract will not relieve the Contractor from responsibility.
  - 1. When materials and work at the site that have been partially paid for are not adequately protected by the Contractor, such materials will be protected by the Owner at the expense of the Contractor and no further partial payment thereon will be made.
- L. Maintain finished surfaces clean, unmarred, and suitably protected until accepted by the Owner.
- M. Electrical and control equipment:
  - 1. Store in a dry area protected from dust and humidity.
  - 2. Equipment can be protected by a weatherproof cover if shipped to the site no more than two (2) weeks prior to installation and energization.

### **3.05 REPAIRS AND REPLACEMENTS**

- A. In the event of damage, promptly make replacements and repairs to the approval of the Engineer and at no additional cost to the Owner.
- B. Additional time required to secure replacements and to make repairs will not be considered by the Engineer to justify an extension in the contract time of completion.

**END OF SECTION**



**SECTION 01 70 00**  
**EXECUTION REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Examination, preparation, and general installation procedures.
- B. Requirements for alterations work, including selective demolition.
- C. Pre-installation meetings.
- D. Cutting and patching.
- E. Surveying for laying out the work.
- F. Cleaning and protection.
- G. Starting of systems and equipment.
- H. Demonstration and instruction of the Owner's personnel.
- I. Project Record Documents.
- J. Contract Closeout procedures, except payment procedures.

**1.02 RELATED REQUIREMENTS**

- A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, and Sections in Division 01 of these Specifications.
- B. Other requirements for technical services are stated in other sections of these Specifications.
- C. Section 00 65 19.13 - Contractor's Affidavit.
- D. Section 01 30 00 - Administrative Requirements: Submittals procedures.
- E. Section 01 40 00 - Quality Requirements: Testing and observation procedures.
- F. Section 01 78 00 - Closeout Submittals: Project record documents, operation and maintenance data, warranties and bonds.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
  - 1. On request, submit documentation verifying accuracy of survey work.
  - 2. Submit a copy of site drawing signed by the Land Surveyor, with elevations and locations of the work in conformance with Contract Documents.

3. Submit surveys and survey logs for the project record.
- C. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
1. Structural integrity of any element of Project.
  2. Integrity of weather exposed or moisture resistant element.
  3. Efficiency, maintenance, or safety of any operational element.
  4. Visual qualities of sight exposed elements.
  5. Work of the Owner or separate Contractor.

#### **1.04 QUALIFICATIONS**

- A. For survey work, employ a land surveyor registered in South Carolina. Submit an evidence of Surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate.

#### **1.05 PROJECT CONDITIONS**

- A. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.
- B. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- C. Dust Control: Execute work by methods to minimize raising dust from construction operations.
- D. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
- E. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
1. Minimize amount of bare soil exposed at one time.
  2. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
  3. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
  4. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.
- F. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
- G. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

## **1.06 COORDINATION**

- A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Notify affected utility companies and comply with their requirements.
- C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- F. Coordinate completion and clean-up of work of separate sections.
- G. After the Owner's occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of the Owner's activities.

## **PART 2 PRODUCTS**

### **2.01 PATCHING MATERIALS**

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 60 00 Product Requirements.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work.
- B. Start of work means acceptance of existing conditions.
- C. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- D. Examine and verify specific conditions described in individual specification sections.

- E. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- F. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- G. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

### **3.02 PREPARATION**

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

### **3.03 PREINSTALLATION MEETINGS**

- A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Alliance Consulting Engineers, Inc. four (4) days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
  - 1. Review conditions of examination, preparation and installation procedures.
  - 2. Review coordination with related work.
- E. Record minutes and distribute copies within two (2) days after meeting to participants, with two (2) copies to Alliance Consulting Engineers, Inc., Owners, participants, and those affected by decisions made.

### **3.04 LAYING OUT THE WORK**

- A. Verify locations of survey control points prior to starting work.
- B. Promptly notify Alliance Consulting Engineers, Inc. of any discrepancies discovered.
- C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- D. Promptly report to Alliance Consulting Engineers, Inc. the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Alliance Consulting Engineers, Inc.
- F. Utilize recognized engineering survey practices.

- G. Establish a minimum of two (2) permanent bench marks on site, referenced to established control points. Record locations, with horizontal and vertical data, on project record documents.
- H. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
  - 1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
  - 2. Grid or axis for structures.
- I. Periodically verify layouts by same means.
- J. Maintain a complete and accurate log of control and survey work as it progresses.

### **3.05 GENERAL INSTALLATION REQUIREMENTS**

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.

### **3.06 ALTERATIONS**

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
  - 1. Verify that construction and utility arrangements are as shown.
  - 2. Report discrepancies to Alliance Consulting Engineers, Inc. before disturbing existing installation.
  - 3. Beginning of alterations work constitutes acceptance of existing conditions.
- B. Remove existing work as indicated and as required to accomplish new work.
  - 1. Remove items indicated on drawings or described in the Technical Specifications.
  - 2. Relocate items indicated on drawings or described in the Technical Specifications.

- C. Services (Including but not limited to Fire Protection, Electrical and Telecommunications): Remove, relocate and extend existing systems to accommodate new construction.
  - 1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
  - 2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
  - 3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
    - a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
    - b. Provide temporary connections as required to maintain existing systems in service.
  - 4. Verify that abandoned services serve only abandoned facilities.
- D. Protect existing work to remain.
  - 1. Prevent movement of structure; provide shoring and bracing if necessary.
  - 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
  - 3. Repair adjacent construction and finishes damaged during removal work.
  - 4. Patch as specified for patching new work.
- E. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
  - 1. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Alliance Consulting Engineers, Inc.
- F. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.
- G. Clean existing systems and equipment.
- H. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
- I. Do not begin new construction in alterations areas before demolition is complete.
- J. Comply with all other applicable requirements of this section.

### 3.07 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. See Alterations article above for additional requirements.
  - 1. Complete the work.
  - 2. Fit products together to integrate with other work.
  - 3. Provide openings for penetration of mechanical, electrical and other services.
  - 4. Match work that has been cut to adjacent work.
  - 5. Repair areas adjacent to cuts to required condition.
  - 6. Repair new work damaged by subsequent work.
  - 7. Remove samples of installed work for testing when requested.
  - 8. Remove and replace defective and non-conforming work.
- C. Execute cutting and patching including excavation and fill to complete the work, to uncover work in order to install improperly sequenced work, to remove and replace defective or non-conforming work, to remove samples of installed work for testing when requested, to provide openings in the work for penetration of mechanical and electrical work, to execute patching to complement adjacent work, and to fit products together to integrate with other work.
- D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- E. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- G. Restore work with new products in accordance with requirements of Contract Documents.
- H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- I. Patching:
  - 1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
  - 2. Match color, texture, and appearance.
  - 3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

- J. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
- K. Make neat transitions. Patch work to match adjacent work in texture and appearance. Where new work abuts or aligns with existing, perform a smooth and even transition.
- L. Patch or replace surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. Repair substrate prior to patching finish. Finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, refinish entire surface to nearest intersections.

### **3.08 PROGRESS CLEANING**

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

### **3.09 PROTECTION OF INSTALLED WORK**

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Remove protective coverings when no longer needed; reuse or recycle plastic coverings if possible.

### **3.10 SYSTEM STARTUP**

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- D. Verify that wiring and support components for equipment are complete and tested.
- E. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- F. Submit a written report that equipment or system has been properly installed and is functioning correctly.

### **3.11 DEMONSTRATION AND INSTRUCTION**

- A. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.



- B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- C. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of owner personnel.

### **3.12 ADJUSTING**

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

### **3.13 FINAL CLEANING**

- A. Execute final cleaning prior to final project assessment.
- B. Use cleaning materials that are nonhazardous.
- C. Clean site; sweep paved areas, rake clean landscaped surfaces.
- D. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

### **3.14 PROJECT RECORD DOCUMENTS**

- A. Work includes:
  - 1. Throughout progress of the Work, maintain an accurate record of changes in the Contract Documents, as described in Article 3.1 below.
  - 2. Upon completion of the Work, deliver the recorded changes to the Engineer.
- B. Related work:
  - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, and Sections in Division 01 of these specifications.
  - 2. Other requirements affecting Project Record Documents may appear in pertinent other Sections of these specifications.
- C. Quality assurance:
  - 1. Delegate the responsibility for maintenance of Record Documents to one person on the Contractor's staff as approved by the Engineer.
  - 2. Accuracy of records shall be such that future search for items shown on the Project Record Documents may rely reasonably on the information provided under this Section of the Work.
- D. Submittals:
  - 1. The Engineer's approval of the current status of Project Record Documents may be a prerequisite to the Engineer's approval of requests for progress payment and request for final payment under the Contract.
  - 2. Prior to submitting each request for progress payment, secure the Engineer's approval of the current status of the Project Record Documents.

3. Prior to submitting request for final payment, submit the final Project Record Documents to the Engineer and secure his approval.
- E. Product handling:
1. Maintain Record Documents completely protected from deterioration and from loss and damage until completion of the Work and transfer to the Engineer.
  2. In the event of loss of recorded data, use means necessary to again secure the data to the Engineer's approval.
    - a. Such means shall include, if necessary in the opinion of the Engineer, removal and replacement of concealing materials.
    - b. In such case, provide replacements to the standards originally required by the Contract Documents.
- F. Job Set Documents:
1. Promptly following receipt of the Owner's Notice to Proceed, secure from the Engineer, at no charge to the Contractor, one complete set of all Documents comprising the Contract.
- G. Maintenance of Job Set:
1. Immediately upon receipt of the job set described in above paragraph titled "JOB SET DOCUMENTS", identify each of the Documents with the title, "RECORD DOCUMENTS - JOB SET".
  2. Preservation:
    - a. Considering the Contract completion time, the probable number of occasions upon which the job set must be taken out for new entries and for examination, and the conditions under which these activities will be performed, devise a suitable method for protecting the job set to the approval of the Engineer.
    - b. Do not use the job set for any purpose except entry of new data and for review by the Engineer.
    - c. Maintain the job set at the site of Work as that site is designated by the Engineer.
  3. Making entries on Job Set Drawings:
    - a. Use erasable colored pencil, preferably red (not ink or indelible pencil) to delineate changes.
    - b. Show by station number location of all fittings, manholes, valves, wye locations, etc.
    - c. Reference all fittings and valves to two aboveground items reasonably safe from being relocated and indicate such references on the drawings.
    - d. Show location of electrical conduit, pull boxes, etc.

4. Submittal:
  - a. Submit "marked-up" set of drawings to the Engineer.
    - i. Make any necessary additions as required by the Engineer.

### **3.15 CLOSEOUT PROCEDURES**

- A. Work included shall be providing compliance with the requirements of the General Conditions of these Specifications for administrative procedures in closing out the project work.
- B. Make submittals that are required by governing or other authorities.
  1. Provide copies to Alliance Consulting Engineers, Inc.
  2. When the Engineer finds the Contractor's work acceptable, the Contractor shall be given such notice and should proceed with closeout submittals.
  3. Closeout submittals shall contain at least the following:
    - a. Project record documents.
    - b. Equipment operation and maintenance manuals and copies of start-up reports.
    - c. Warranties and bonds.
    - d. Spare parts and manuals.
    - e. Evidence of payment and release to liens per General Conditions.
    - f. Section 00 65 19.13 - Contractor's Affidavit.
- C. Notify Alliance Consulting Engineers, Inc. when work is considered ready for Substantial Completion.
  1. The Contractor shall notify the Engineer that, in his opinion, the project is substantially complete. A written statement listing items complete shall be submitted.
  2. Upon receipt of the Contractor's notice, the Engineer shall make an observation to determine if substantial completion is provided.
  3. If, in the Engineer's opinion, the project is not substantially complete, a written notice to the Contractor shall follow outlining reasons and deficiencies in work that comprised the Engineer's decision. The Engineer's decision shall be final.
- D. Request and obtain permit acceptance on all open construction permits.
- E. Submit written certification that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Alliance Consulting Engineers, Inc.'s review.
- F. Correct items of work listed in executed Certificates of Substantial Completion

and comply with requirements for access to Owners-occupied areas.

- G. Accompany Engineer & Owner on preliminary final observation.
  - 1. The Engineer will make a final observation for the Contractor after all items noted in the substantial completion observation have been corrected. The Contractor shall notify the Engineer in writing when a final observation is needed. Incomplete and/or defective work shall be given to the Contractor by written notice.
- H. Notify Alliance Consulting Engineers, Inc. when work is considered finally complete.
- I. Complete items of work determined by Alliance Consulting Engineers, Inc.'s final observation.
- J. Re-observation:
  - 1. Re-observation required due to failure by the Contractor to make previously noted corrections will be performed by the Engineer.
  - 2. Cost for such observations will be due to and payable by the Contractor at a rate equal to charges to the Owner for similar work.
  - 3. Re-observations will continue until the work is acceptable to the Engineer.
- K. Final Payment:
  - 1. Final payment to the Contractor will be made upon completion of the previous items and others required by these specifications. A final statement shall be forwarded to the Engineer. The statement shall address:
    - a. Previous change orders.
    - b. Unit prices.
    - c. Deductions for un-corrected work.
    - d. Deductions for liquidated damages.
    - e. Deductions for re-testing work.
    - f. Deductions for re-observation.
    - g. Deductions for shop drawing review.
    - h. Adjusted contract sum.
    - i. Previous payments.
    - j. Amount due.
  - 2. When required, the Engineer will prepare a contract change order for adjustments not previously made.

**END OF SECTION**

## **SECTION 01 71 23**

### **FIELD ENGINEERING**

#### **PART 1 GENERAL**

##### **1.01 DESCRIPTION**

- A. Work included: Provide such field engineering services as are required for proper completion of the Work.

##### **1.02 Related work:**

- A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions and Sections in Division 01 of these Specifications.

##### **1.03 QUALITY ASSURANCE**

- A. Provide competent labor, supervision, inspection services, testing services, materials and equipment for a complete and quality rehabilitation and coating project.
- B. Exercise proper precautions to verify the information described in the Technical Specifications and Contract Documents prior to laying out or performing any part of the Work.
  - 1. The Contractor will be held responsible for any errors therein that otherwise might have been avoided.
  - 2. Promptly inform the Engineer of any errors or discrepancies discovered in the Technical Specifications in order that proper corrections may be made.

##### **1.04 PROCEDURES**

- A. Verify lead content of existing coating system before starting work on the site.
- B. Secure all required permits and make all required and necessary notifications before starting work on the site.
- C. Perform preparation, coating and repair task during progress of the Work consistent with the spirit of the Technical Specifications.
- D. Do not deviate from or change items of the Work without specific approval from the Engineer.
- E. Promptly advise the Engineer when a change becomes necessary because of other changes in the Work.

#### **PART 2 PRODUCTS – NOT USED**

#### **PART 3 EXECUTION – NOT USED**

**END OF SECTION**

## SECTION 01 74 19

### WASTE MANAGEMENT

#### PART 1 GENERAL

##### 1.01 WASTE MANAGEMENT REQUIREMENTS

- A. The Owner requires that this Project generate the least amount of trash and waste possible.
- B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.
- C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.
- D. Methods of trash/waste disposal that are **not** acceptable are:
  - 1. Burning on the project site.
  - 2. Burying on the project site.
  - 3. Other illegal dumping or burying.
- E. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

##### 1.02 DEFINITIONS

- A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.
- B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.
- C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.
- D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.
- E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.
- F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
- G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.
- H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

- I. Return: To give back reusable items or unused products to vendors for credit.
- J. Reuse: To reuse a construction waste material in some manner on the project site.
- K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.
- L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.
- M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.
- N. Toxic: Poisonous to humans either immediately or after a long period of exposure.
- O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.
- P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

### **1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

## **PART 2 PRODUCTS**

### **2.01 No products are required under this Section.**

- A. See Section 01 60 00 - Product Requirements for substitution submission procedures.
- B. For each proposed product substitution, submit the following information in addition to requirements specified in Section 01 60 00 Product Requirements:
  - 1. Relative amount of waste produced, compared to specified product.
  - 2. Cost savings on waste disposal, compared to specified product, to be deducted from the Contract Sum.
  - 3. Proposed disposal method for waste product.
  - 4. Markets for recycled waste product.

## **PART 3 EXECUTION**

### **3.01 WASTE MANAGEMENT PROCEDURES**

- A. See Section 01 30 00 Administrative Requirements for additional requirements for project meetings, reports, submittal procedures and project documentation.
- B. See Section 01 60 00 Product Requirements for waste prevention requirements related to delivery, storage and handling.
- C. See Section 01 70 00 Execution Requirements for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection and cleaning.

### **3.02 WASTE MANAGEMENT PLAN IMPLEMENTATION**

- A. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse and return methods to be used by all parties at the appropriate stages of the project.
- B. Meetings: Discuss trash/waste management goals and issues at project meetings.
  - 1. Pre-bid meeting.
  - 2. Pre-construction meeting.
  - 3. Regular job-site meetings.
- C. Reuse of Materials On-Site: Set aside, sort and protect separated products in preparation for reuse.
- D. Salvage: Set aside, sort and protect products to be salvaged for reuse off-site.

**END OF SECTION**



## SECTION 01 78 00

### CLOSEOUT SUBMITTALS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Project Record Documents.
- B. Operation and Maintenance Data.
- C. Warranties and Bonds.

##### 1.02 RELATED REQUIREMENTS

- A. Section 00 70 00 – Standard General Conditions of the Construction Contract: Performance bond and labor and material payment bonds, warranty, and correction of work.
- B. Section 01 30 00 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- C. Section 01 70 00 - Execution Requirements: Contract closeout procedures.
- D. Individual Product Sections: Specific requirements for operation and maintenance data.
- E. Individual Product Sections: Warranties required for specific products or Work.

##### 1.03 SUBMITTALS

- A. Project Record Documents: Contractor to keep Record Documents on site at all times for review by Engineer or Owner. Submit documents to Alliance Consulting Engineers, Inc. with claim for final Application for Payment.
- B. Operation and Maintenance Data:
  - 1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Alliance Consulting Engineers, Inc. will review draft and return one copy with comments.
  - 2. For equipment, or component parts of equipment put into service during construction and operated by the Owners, submit completed documents within ten days after acceptance.
  - 3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Alliance Consulting Engineers, Inc. comments. Revise content of all document sets as required prior to final submission.
  - 4. Submit two sets of revised final documents in final form within 10 days after final inspection.

- C. Warranties and Bonds:
1. For equipment or component parts of equipment put into service during construction with the Owners permission, submit documents within 10 days after acceptance.
  2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
  3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

## **PART 2 PRODUCTS - NOT USED**

## **PART 3 EXECUTION**

### **3.01 PROJECT RECORD DOCUMENTS**

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
1. Drawings.
  2. Addenda.
  3. Change Orders and other modifications to the Contract.
- B. Ensure entries are complete and accurate, enabling future reference by the Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Record Drawings: Legibly mark each item to record actual construction including:
1. Field changes of dimension and detail.
  2. Details not on original Contract drawings.

### **3.02 OPERATION AND MAINTENANCE DATA**

- A. For Each Product or System: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
- B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

### **3.03 OPERATION AND MAINTENANCE MANUALS**

- A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.
- B. Prepare data in the form of an instructional manual.

### **3.04 WARRANTIES AND BONDS**

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with The Owners permission, leave date of beginning of time of warranty until the Date of Substantial completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.

**END OF SECTION**

**SECTION 02 32 13**  
**SUBSURFACE EXPLANATION**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

- A. Soils investigation report:
  - 1. Report of Geotechnical Exploration – Prepared for the Project by SM&E, Inc. dated April 24, 2009 for the Report of Subsurface Explanation at Mid-Carolina Commerce Park for Phase IIA and III Roadway, Newberry County, South Carolina (S&ME Project Number 1611-09-106).
    - a. A Copy of the reports are included
- B. Use of data:
  - 1. These reports were obtained only for the Engineer's use in design and is not a part of the Contract Documents.
  - 2. The report is available for bidders' information, but is not a warranty of subsurface conditions.
  - 3. It is the responsibility of the Bidders to visit the site and acquaint themselves with the existing conditions.
  - 4. Prior to bidding, bidders may make their own Subsurface Investigations to satisfy themselves as to site and subsurface soil conditions, but these investigations must be performed under the time schedules and arrangements that have been approved in advance by the Engineer.

**1.02 QUALITY ASSURANCE**

- A. The Owner will retain a soils engineer to observe the performance of work in connection with excavating, trenching, filling, backfilling and grading, and to perform compaction tests as required.
- B. All work that is performed under this contract that does not meet technical or design requirements must be adjusted and no deviation from the Contract Documents can be made without specific and written approval from the Engineer.

**PART 2 - PRODUCTS - NOT USED**

**PART 3 - EXECUTION - NOT USED**

**END OF SECTION**

REPORT OF  
SUBSURFACE EXPLORATION  
  
**MID-CAROLINA COMMERCE PARK  
PHASE IIA & III ROADWAY  
NEWBERRY COUNTY, SOUTH CAROLINA  
S&ME PROJECT NO. 1611-09-106**

**Prepared For:**

**Alliance Consulting Engineers, Inc.  
Post Office Box 8147  
Columbia, South Carolina 29202-8147**

**Prepared By:**



**S&ME, Inc.  
134 Suber Road  
Columbia, South Carolina 29210**

**April 24, 2009**



April 24, 2009

Alliance Consulting Engineers, Inc.  
Post Office Box 8147  
Columbia, South Carolina 29202-8147

Attention: Mr. Christian C. Jones, EIT

**Reference: REPORT OF SUBSURFACE EXPLORATION**  
Mid-Carolina Commerce Park Phase IIA and III Roadway  
Newberry County, South Carolina  
S&ME Project No. 1611-09-106

Dear Mr. Jones:

As requested, S&ME, Inc. (S&ME) has completed field and laboratory testing of the proposed Mid-Carolina Commerce Park Phase IIA and III Roadway in Newberry County, South Carolina. Our work was performed in general accordance with our proposal (No. 1611-6727-09) dated March 26, 2009, our Change of Scope letter dated March 30, 2009 and the under terms and conditions of the indefinite delivery contract between Alliance Consulting Engineers, Inc. and S&ME dated January 15, 2007. This report provides the exploration and testing procedures, our boring logs, the laboratory test results and our recommendations regarding site preparation, fill placement, pavement section thicknesses and design parameters for the pump station.

S&ME appreciates this opportunity to work with Alliance Consulting Engineers as your geotechnical engineering consultant on this project. Please contact us at (803) 561-9024 if you have any questions or need any additional information regarding this report.

Sincerely,  
S&ME, Inc.

*Melissa Quinton*

Melissa Quinton, P.E.  
Geotechnical Engineer  
mqinton@smeinc.com



*James T. Palmer*

James T. Palmer, P.E.  
Engineering Manager  
jpalmer@smeinc.com

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### **APPENDIX**

Figure 1 – Site Vicinity Map

Figure 2 – Boring Location Plan

Summary of Exploration Procedures

Boring Logs

Laboratory Data

## EXECUTIVE SUMMARY

The information provided in this executive summary is intended to be a brief overview of project information and recommendations from the geotechnical report. Information in the executive summary should not be used without first reading the geotechnical report and the recommendations described therein.

Our subsurface exploration was performed at the proposed Mid-Carolina Commerce Park Phase IIA and III Roadway located off of SC Highway 773 in Newberry County, South Carolina. The exploration included twelve soil test borings along the centerline of the proposed roadway. The site is mostly wooded consisting of mature and sapling pines with sparsely spaced hard woods. In addition, the site exhibits considerably rolling terrain with elevation changes of approximately 100 feet based on the provided topographical map. The most notable drainage feature is a stream flowing south to north across the site. At the time of our field exploration the majority of the site was dry with the exception of flowing water noted in lower lying stream feature. Some rock outcropping was observed in areas along the stream bed.

Our borings generally encountered sandy lean clays, clayey sands, sandy silts (ML and MH) and silty sands beneath the topsoil to depths ranging from about 5 feet to 15 feet below the ground surface. Partially Weathered Rock was encountered at approximate depths ranging from the ground surface to 10 feet (Elevation 422 to 450 feet) in borings B-2, B-4, B-5, and B-7 through B-9. Auger refusal was encountered at an approximate depth of 10 feet below the ground surface (Elevation 438 feet) in boring B-5. The potential exists that PWR and/or massive rock will be encountered at shallower depths at locations between our boring locations. Approximately zero to three inches of topsoil was encountered at our boring locations; however, these thicknesses were likely disturbed during clearing for access to the boring locations. Groundwater was not encountered at the time of drilling in any of our borings at the site. Groundwater may be encountered at relatively shallow depths near the existing stream during construction.

The sandy clays, clayey sands, sandy silts (ML), and silty sands encountered near the ground surface of our borings are suitable for use as structural fill, provided they are free of deleterious materials. These soils will have a tendency to retain moisture. If these soils are used as structural fill, extended drying times may be required during wet weather grading. The Sandy Elastic Silts (MH) encountered in the upper 8-1/2 feet of boring B-10 should be avoided for use as fill.

The soil profiles encountered appear generally suitable for the proposed development. Pavement design was based on a California Bearing Ratio of 3 percent for sandy lean clay soils compacted to 98 percent of the standard Proctor maximum dry density. Traffic is assumed to be on the order of 3,190,720 Equivalent Single Axle Loads over a 20 year design life. Two options for asphalt pavement sections are provided.



## 1. PROJECT INFORMATION

Information about the project was obtained in an e-mail from Christian Jones with Alliance Consulting Engineers to Trapp Harris with S&ME on March 24, 2009. Roadway plan and profile drawings were attached to the e-mail. This project proposes the new construction of approximately 2,500 feet roadway that will comprise phases IIA and III of the Mid-Carolina Commerce Park. S&ME is familiar with the site, and has completed a geotechnical exploration for the Phase I portion of the roadway under S&ME Project No. 1611-07-329, dated August 10, 2007. The proposed site is located on wooded undeveloped land off of SC Highway 773 near its intersection with Interstate 26 in Newberry County, South Carolina. A site location map is attached as Figure 1. Anticipated traffic volumes for the proposed park were not available as of the date of this report. We have assumed traffic volumes and loadings based on our experience with similar industrial park developments.

## 2. EXPLORATION PROCEDURES

On March 30<sup>th</sup> and 31<sup>st</sup>, 2009, a representative from S&ME visited the site to observe current site conditions, supervise clearing operations, and lay out proposed boring locations. The proposed boring locations and clearing paths were laid out by a hand held GPS unit utilizing state plane coordinates provided by Alliance Consulting Engineers, Inc. Cleared paths and our borings were located as close as practical to the centerline of the proposed roadway. Borings B-4 and B-5 were offset approximately 80 feet left of the centerline due to a drainage ditch approximately 5 feet deep, which would have required extensive clearing and grading to allow access to the drilling rig. Boring B-11 was offset approximately 50 feet right of the proposed centerline due to steep terrain.

The field subsurface exploration was performed on April 8<sup>th</sup> and 9<sup>th</sup>, 2009. The field exploration included 12 soil test borings and Standard Penetration Test (SPT) sampling and testing. In addition, two 30 to 50 pound bulk samples were collected of soils that will likely comprise the subgrade for pavements. These activities were completed at the approximate locations shown on Figure 2.

## 3. LABORATORY TESTING

After visual observation and manual manipulation of the soil samples, it was determined that the samples obtained directly beneath the topsoil at the site consisted of Sandy Clays (CL), Clayey Sands (SC), Silty Sands (SM) and Sandy Silts (ML and MH). Laboratory tests were performed on two bulk samples. Bulk sample 1 was obtained from the auger cuttings from boring B-4, and bulk sample 2 was obtained from the auger cuttings of boring B-9. We conducted the following quantitative laboratory tests:

- Two Standard Proctor Moisture Density Relationship Tests (ASTM D698)

- Two remolded California Bearing Ratio (CBR) tests (ASTM D1883)
- Two Atterberg Limits tests (ASTM D4318)
- Two Wash 200 sieve analysis tests (ASTM D422)
- Four natural moisture content tests (ASTM D2116)

Standard Proctor and CBR test results are provided in the following table.

**Table 1: Summary of Standard Proctor and CBR Laboratory Test Results**

Sample No.	Soil Type	Maximum Dry Density	Optimum Moisture Content	CBR
Bulk Sample 1 (Boring B-4, 0 – 5 ft)	Clayey Sand (SC)	119.0 pcf	12.1%	6%
Bulk Sample 2 (Boring B-9, 0 – 5 ft)	Sandy Lean Clay (CL)	107.9 pcf	16.5%	3%

Standard Proctor and CBR tests were used to help evaluate soil support values for pavement sections. Additional laboratory testing was conducted on split spoon samples obtained at the site, including wash 200 sieve analysis, Atterberg Limits, and natural moisture content tests. This information was used to help classify the soils encountered. Laboratory test results are attached in the Appendix.

#### 4. SITE CONDITIONS

S&ME's assessment of the geotechnical conditions began with a reconnaissance of the topography and physical features of the site. We also consulted available topographic and geologic maps, for relevant information.

##### 4.1 Surface Conditions

The project site is situated at the southwest corner of Hwy 773 and Interstate 26 in Newberry County, South Carolina. The site is accessible by a dirt road from Highway 773 on the north side of the project, and overhead utility corridor on the south side of the project. The site exhibits considerably rolling terrain with elevation changes of approximately 100 feet by observation and based on the provided topographical map. The site is mostly wooded consisting of mature and sapling pines with sparsely space hard woods. Ground cover consists of sandy clay soils on the upper elevations and sandy soils observed near the stream elevation. The most notable drainage feature is a stream flowing northwest across the site. At the time of our field exploration the majority of the site was dry with the exception of flowing water noted in lower lying stream feature. Some rock outcropping was observed in areas along the stream bed.

## 4.2 Subsurface Conditions

Recovered field samples and field boring records were reviewed in the laboratory by the geotechnical professional. Finished soil test boring records and other field data are assembled in the Appendix.

### 4.2.1 Site Geology

The site lies within the Piedmont Physiographic Province of South Carolina, an area underlain by soils weathered in place from the parent crystalline bedrock material. Residual soils of the Carolina Piedmont consist of stiff or very stiff micaceous silts and clays, grading to firm sands with depth. These soils have been completely weathered in place from the parent bedrock material, but below depths of a few feet retain most of the relict rock structure. Soil strength derives largely from relict intermolecular bonding and remolded materials generally less exhibit lower shear strength than do undisturbed samples. Piedmont soils are normally consolidated to slightly overconsolidated.

The term *partially weathered rock (PWR)* is applied to very dense micaceous sands or silty sands of the Carolina Piedmont, which register SPT N-values in excess of 100 blows per foot. PWR generally varies widely within even small areas owing to minute differences in the chemical properties of the parent bedrock, which results in widely varying rates of weathering. Isolated lenses or seams of PWR often are present within Piedmont Residuum well above the overall PWR level within a given area. PWR is considered excellent bearing material for foundations and is relatively incompressible except in highly stressed deep foundations.

PWR was encountered at approximate depths ranging from the ground surface to 10 feet (Elevation 422 to 450 feet) in borings B-2, B-4, B-5, and B-7 through B-9. Auger refusal was encountered at an approximate depth of 10 feet below the ground surface (Elevation 438 feet) in boring B-5. Auger refusal often occurs on coarse gravel, boulders or hard rock. The potential exists that PWR, boulders and/or hard rock will be encountered at shallower depths at locations between our boring locations.

### 4.2.2 Interpreted Subsurface Profile

The generalized subsurface conditions at the site are described below. For detailed descriptions and stratification at a particular boring location, the respective boring record should be reviewed. Subsurface conditions between the borings will likely vary. The nature and extent of variations between the sampling points will not become evident until construction. Soil test boring logs are attached in the Appendix.

Top-of-ground elevations shown on the boring logs are assumed and were derived from the topographic site plan provided by Alliance Consulting Engineers for demonstration purposes only. Boring locations and elevations were not surveyed.

### Topsoil

Approximately zero to three inches of topsoil was encountered at our borings locations at the site. Topsoil thicknesses were likely disturbed during clearing activity to access boring locations. While these measurements are likely representative of the topsoil thicknesses that will be encountered during construction, the potential exists that greater topsoil thickness may be encountered at other locations on the site.

### Piedmont Soils Encountered

Soils encountered in our borings consisted mainly of sandy lean clays, clayey sands, silty sands, and sandy silts.

Sandy lean clay soils were encountered from just below the topsoil, where encountered, to depths of about 3-1/2 feet to 5 feet below the ground surface in borings B-1 through B-3, B-5, B-6, B-11 and B-12. This is about 60 percent of the boring locations. These soils were generally brown, to reddish brown, and gray in color and moist with low to medium plasticity fines and fine to medium sands. Standard Penetration Test (SPT) N-values (blow counts) for sandy clays encountered in our borings ranged from 6 to 38 blows per foot indicating a firm to hard consistency. Consistency was generally firm to stiff in the upper strata and becoming very stiff to hard with depth.

Clayey sands were encountered beneath the topsoil to a depth of about 3-1/2 feet in boring B-4. These soils were generally reddish-brown and tan in color and were wet, with fine to medium sands and low plasticity fines. An SPT N-value of 4 blows per foot was recorded in this layer, indicating a very loose relative density.

Silty sands were encountered beneath the topsoil to depths of approximately 6 feet to 10 feet in borings B-7 and B-8, and beneath the sandy clays and clayey sands to depths of about 5 feet to 15 feet in borings B-1, B-2, and B-10 through B-12. Silty sands were generally brown or tan in color and moist with fine to medium sands and low plasticity fines. SPT N-values recorded in these soils ranged from 20 to 43 blows per foot, indicating a medium dense to dense relative density.

Sandy silts (ML and MH) were encountered from a depth of about 3-1/2 feet to termination of drilling at 10 feet in boring B-6, and beneath the topsoil to a depth of about 8-1/2 feet in boring B-10. Sandy silt (ML) encountered in boring B-6 was generally tan to brown with low plasticity fines and fine to medium sands. Sandy elastic silt (MH) encountered in boring B-10 was generally reddish-brown with a trace of white with medium to high plasticity fines and fine sands. SPT N-values recorded in these layers ranged from 13 to 43 blows per foot, indicating a stiff to hard consistency. Consistency was generally stiff in the upper 2 feet of the strata and becoming very stiff to hard with depth.

### Partially Weathered Rock (PWR)

PWR was encountered at approximate depths ranging from the ground surface to 10 feet (Elevation 422 to 450 feet) in borings B-2, B-4, B-5, and B-7 through B-9. Auger refusal was encountered at an approximate depth of 10 feet below the ground surface (Elevation 438 feet) in boring B-5. Auger refusal at location B-5 was likely on a boulder or massive rock. Recovered PWR material in our borings was sampled as silty sands. This material was generally gray, brown, and white in color and dry with mostly fine sands and little low plasticity fines. Standard Penetration Test N-values for PWR were in excess of 100 blows per foot indicating a very dense relative density.

### Groundwater

Groundwater was not encountered at our boring locations during the time of our site investigation. Due to the nature of soils encountered in our borings, it is possible that perched seams or lenses of water may be encountered during construction. These seams or lenses of perched water generally occur on layers of dense sands or stiff clays and silts during wet periods. Groundwater may also be encountered at relatively shallow depths near the existing stream.

## 5. RECOMMENDATIONS

The following paragraphs include our conclusions and recommendations for site preparation, excavation at the site and the design and fill placement and compaction. The soil profile encountered at this site appears generally suitable for the proposed development.

In the Piedmont geological province the depth to PWR and/or rock can vary greatly over short distances. Because of this, there is some potential that excavation at the site will encounter very hard digging or will require ripping, the use of pneumatic tools or blasting.

### **5.1 Site Preparation**

Based on the provided roadway profile drawing, cut and fill of up to 15 to 20 feet is anticipated in areas of the site during construction. Below are recommendations for preparation of the site prior to fill placement and compaction.

#### *5.1.1 Stripping and Grubbing*

Strip and grub all vegetation and topsoil in the proposed pavement areas and dispose of this material outside of the footprint of pavement areas. Large stumps and tree root bulbs should be completely removed.

#### *5.1.2 Proofrolling/Densification of the Stripped Surface*

After stripping and cutting to grade, in areas that will receive less than 12 inches of new fill, the upper 12 inches of existing soils should be compacted to at least 98 percent of

standard Proctor maximum dry density. Where encountered dense/hard soils and PWR soils should be disturbed as little as possible and additional compaction is not required. Where dense/hard soils or PWR is encountered, in cut areas and in areas that will receive more than 12 inches of new fill, the exposed surface should be proofrolled using a heavily loaded truck or pan to identify soft areas.

Areas which rut or pump excessively under the proofrolling operation will need to be stabilized prior to placement of new fill soil or base course layers. Soft, wet or unstable soils may make it difficult to achieve the required compaction and will exhibit substantially lower bearing for pavements. Stabilization, if required, may consist of scarifying and/or drying and recompacting any soft or wet surface soils or undercutting and replacing unstable material. Additional stabilization may be required if surface soils are heavily reworked or allowed to become saturated during construction. The geotechnical engineer or a representative of the geotechnical engineer should be present to observe and document surface preparation and proofrolling.

## **5.2 Site Excavation**

The boring data indicates that excavation at the site will extend through loose to medium dense or stiff to hard material to a depth of approximately 5 to 15 feet below the ground surface. These consistency soils can normally be excavated by routine earthmoving equipment. However, there is a strong potential that very hard or very dense soils, PWR or even rock will be encountered at shallow depths. This is evidenced by rock out cropping being observed near the stream locations.

Excavations greater than 5 to 10 feet below the ground surface may extend through very dense partially weathered rock. Heavy excavating equipment with ripping tools will probably be effective in removing the partially weathered rock during site grading. The speed and ease of excavation will depend on the type of grading equipment, operator skill and the geologic structure of the material itself, such as the direction of bedding, planes of weakness, and spacing of discontinuities.

Rock excavation may be required where excavations extend below the boring refusal elevation of 438 feet at the site. The volume of rock excavation can have a major impact on the project cost, particularly when substantial quantities of rock must be excavated. Small diameter exploratory borings at dispersed locations do not provide sufficient information for reliable rock quantity estimates. This is particularly true where rock conditions are extremely variable from point to point. There could be seams or knobs of dense rock at some locations which would necessitate much greater rock removal than expected.

### **5.2.1 Groundwater**

Groundwater is not likely to be encountered during site excavations. In small shallow excavations groundwater, if encountered, can likely be controlled by the construction of sumps and pumping.

### **5.3 Fill Placement and Compaction**

The sandy clays, clayey sands and silty sands encountered near the ground surface are suitable for use as structural fill. The sandy clays and clayey sands will have a tendency to retain moisture and extended drying times may be required during wet weather grading.

Sandy elastic silt (MH) soils similar to those encountered in the upper 8-1/2 feet of boring B-10 should be avoided for use as structural fill.

All fill placed in pavement, and embankment areas should be comprised of soils free of organic matter and other deleterious materials. The fill should be uniformly spread in relatively thin lifts (8 inches, loose) and compacted to at least 98 percent of the soil's maximum dry density as determined by a laboratory standard Proctor compaction test (ASTM D-698). The moisture content should be controlled to within plus to minus 3 percent of optimum. In addition to meeting the compaction requirement, fill material should be stable under movement of the construction equipment and should not exhibit rutting or pumping.

It is very important that all fill is uniformly well compacted. Accordingly, fill placement should be monitored by a qualified Materials Technician working under the direction of the Geotechnical Engineer. In addition to this visual evaluation, the Technician should perform at least one in-place density test for each 2000 square feet per lift in mass grading and one density test per 50 feet in utility line trenches.

#### **5.3.1 Wet Weather Grading**

Our experience indicates that the movement of clearing and construction equipment on areas of standing water or saturated soils will result in degradation of the soils to depths of 1 to 2 feet. Repeated passes of equipment will cause rutting and the mixture of surface materials (organics) into what might otherwise be acceptable soils. Movement of construction equipment on saturated soils should be avoided where possible. Where organics and near surface soils become mixed it will be necessary to remove and replace the mixed material.

Based on our experience, sandy clays, clayey sands and silty sands similar to those encountered in our borings may be difficult to work if allowed to become wet. If allowed to become wet these soils will likely impede the movement of construction equipment. These soils may also require extended drying times once wet. To help reduce the

potential for these upper soils becoming wet during rain events, we recommend the surface be “sealed” with a smooth drum roller if rain is pending. Positive drainage from the roadway surface should be maintained.

## 6. PAVEMENT DESIGN

Soaked laboratory California Bearing Ratio (CBR) tests were performed on representative bulk samples (BS-1 and BS-2) obtained from borings B-4 and B-9. The samples were compacted (remolded) to approximately 98 percent of the standard Proctor maximum dry density near the optimum moisture content. A CBR value of 6 percent was obtained at approximately 98 percent compaction from bulk sample BS-1, and a CBR value of 3 percent was obtained at approximately 98 percent compaction from bulk sample BS-2. Based on the soil profile that will likely be affected by the loads applied, a CBR value of 3 percent is recommended for use in design of the pavement section. This is assuming that the upper 12 inches of subgrade material is compacted to at least 98 percent of the standard Proctor maximum dry density. This also assumes that any fill material placed within the proposed pavement area is placed and compacted according to the recommendations given in this report. Imported fill should be tested to determine that it exhibits a soaked CBR of at least 3 percent.

Design procedures are based on the AASHTO Guide for Design of Pavement Structures and associated literature. Based on the subsurface conditions and assuming our grading recommendations will be implemented as specified, the following presents our recommendations regarding typical pavement sections and materials.

### 6.1 Assumed Traffic

Traffic volumes were not made available as of the writing of this report, therefore assumed traffic volumes have been used in analysis and are not guaranteed to represent the actual traffic volumes. If actual traffic volumes differ from those assumed, the pavement section should be reevaluated. For a normal duty section the following assumptions were used:

- A design life of 20 years with **3,190,720** Equivalent Single Axle Loads (ESAL) over the design life.
- Average Daily Traffic of 500 passenger cars per day with 0.006 ESAL per vehicle (six days per week).
- Average Daily Traffic of 200 multiple axle trucks per day with 2.5 ESAL per vehicle (six days per week).
- Five delivery trucks per day with 1.5 ESAL per truck (six days per week).
- Two garbage trucks per week with 2.5 ESAL per truck.



The assumed traffic volumes presented above are the same volumes and loads used during design of the Phase I portion of the roadway during our previous geotechnical exploration (S&ME Project No. 1611-07-329, dated August 10, 2007).

## 6.2 Pavement Section Thickness Recommendations

Our pavement analysis was performed using DARWin Pavement Design and Analysis System software. DARWin uses the AASHTO '93 Flexible Pavement Design Method for analysis of the unreinforced pavement section. Structural design DARWin input data included an initial serviceability of 4.2, a terminal serviceability of 2.2, a reliability level of 70 percent, and an overall standard deviation of 0.45 for flexible pavements.

It is our opinion that the flexible pavement should consist of a wearing course of hot mix asphaltic (HMA) concrete and a base course of graded aggregate material. Graded aggregate material is necessary for structural support and to help transport any rainwater that seeps below the pavement. The results of our design are summarized in the following table.

**Table 2: Recommended Flexible Pavement Section Thicknesses**

Pavement Type	Graded Aggregate Base	Asphalt Binder Course	Asphalt Surface Course
Normal Duty (Option #1) 3,190,720 ESAL	8 in.	4 in.	2 in.
Normal Duty (Option #2) 3,190,720 ESAL	12 in.	3 in.	2 in.

Pavement materials should conform with and be placed in accordance with the South Carolina DOT Standard Specifications for Highway Construction for Type 1 or Type C asphalt. The aggregate base course should consist of Macadam Base Course (Refer to SCDOT Standard Specifications, Section 305 page 209). This base course should be compacted to at least 100 percent of the maximum dry density, as determined by the modified Proctor compaction test (ASTM D 1557-90 or AASHTO T 180-90). To confirm that the base course has been uniformly compacted, in-place field density tests should be performed by a qualified Materials Technician, and the area should be methodically proofrolled under his evaluation.

Although our analysis was based on a 20 year design life, our experience indicates that an overlay may be needed in approximately 7 to 10 years due to normal weathering of the asphaltic concrete. Also, some areas could require repair in a shorter time period.

### **6.3 Construction Considerations**

Recommendations for construction of asphalt pavements are given in the paragraphs below.

#### *6.3.1 Drainage*

Pavement performance is very dependent on subgrade condition. Drainage will have a major impact on subgrade condition. Drainage should be designed to result in subsurface water levels being at least 2 feet below the top of the pavement subgrade. Design should not result in water standing on the pavement surface or behind curbing. Design should result in positive drainage being available from the stone base material.

Where possible, ditches should be excavated adjacent to the pavement shoulders. Shoulder maintenance also plays an important role in continued performance of the pavement section. Shoulders should be maintained such that water does not stand adjacent to the pavement.

The performance of the pavement will be influenced by a number of factors including the actual condition of subgrade soils at the time of pavement installation, installed thicknesses and compaction, and drainage. The subgrade soils should be reevaluated by proofrolling immediately prior to placement of base course stone and any unstable areas repaired. This recommendation is very important to the long-term performance of the pavements. Areas adjacent to pavements (embankments, landscaped island, ditching, etc.) which can drain water (rainwater or sprinklers) should be designed so that water does not seep below the pavements. This may require the use of French drains or swales. Sufficient tests and inspections should be performed during pavement installation to confirm that the required thickness, density, and quality requirements of the specifications are followed.

#### *6.3.2 Construction of Flexible Pavement Sections*

Sufficient testing should be performed during flexible pavement installation to confirm that the required thickness, density, and quality requirements of the pavement specifications are followed. This is very important for the long-term performance of the pavement, and can be performed by S&ME, Inc. as part of our construction materials testing services. In addition, the following guidelines should be considered during construction:

1. Prior to pavement installation, all exposed pavement subgrades should be methodically proofrolled at final subgrade elevation under the observation of the S&ME, Inc. geotechnical engineer, and any identified unstable areas should be repaired as directed.

2. Depending upon conditions at the time of construction, pavement under drainage, French drains, and/or ditches may be required in some areas to control perched groundwater and stabilize subgrades.
3. We recommend the placement of a non-woven filter fabric between the subgrade soils and the underlying sandy clays and sandy silts. The filter fabric may be omitted where the pavement section will be underlain by clayey or silty sands. Placement of the filter fabric will help reduce the potential for contamination of the base course rock by the underlying fine grained soils.
4. All material and construction should be in accordance with the applicable sections of the South Carolina Department of Transportation 2007 Standard Specifications for Highway Construction.
5. As stated in the SCDOT Section 305 specification, new base course should be compacted to at least **100 percent** of the modified Proctor maximum dry density (ASTM D 1557), and should not exhibit pumping or rutting under equipment traffic. Heavy compaction equipment is likely to be required in order to achieve the required base course compaction, and the moisture content of the material will likely need to be maintained very near the optimum moisture content in order to facilitate proper compaction. S&ME, Inc. should be contacted to perform field density and thickness testing of the base course prior to paving.
6. Experience indicates that, for asphalt surfaced roads designed for a 20 year design life, a surface overlay of asphalt pavement may be required in about 10 years due to normal wear and weathering of the surface. Such wear is typically visible in several forms of pavement distress, such as aggregate exposure and polishing, aggregate stripping, asphalt bleeding, and various types of cracking. There are means to methodically estimate the remaining pavement life based on a systematic statistical evaluation of pavement distress density and mode of failure. We recommend the pavement be evaluated in about 7 years to assess the pavement condition and remaining life.

## 7. QUALIFICATIONS OF REPORT

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

The analyses and recommendations submitted herein are based, in part, upon the data obtained from the subsurface exploration. The nature and extent of variations between the borings will not become evident until construction. If variations appear evident, then we will

re-evaluate the recommendations of this report. In the event that any changes in the nature, design, or location of the proposed structure are planned, the conclusions and recommendations contained in this report will not be considered valid unless the changes are reviewed and conclusions modified or verified in writing.

We recommend that S&ME, Inc. be provided the opportunity to review the final design plans and specifications in order to ensure that earthwork and foundation recommendations are properly interpreted and implemented.

# APPENDIX



SOURCE: Google Earth

SCALE:	NTS
CHECKED BY:	JTP
DRAWN BY:	MQ
DATE:	3/27/09

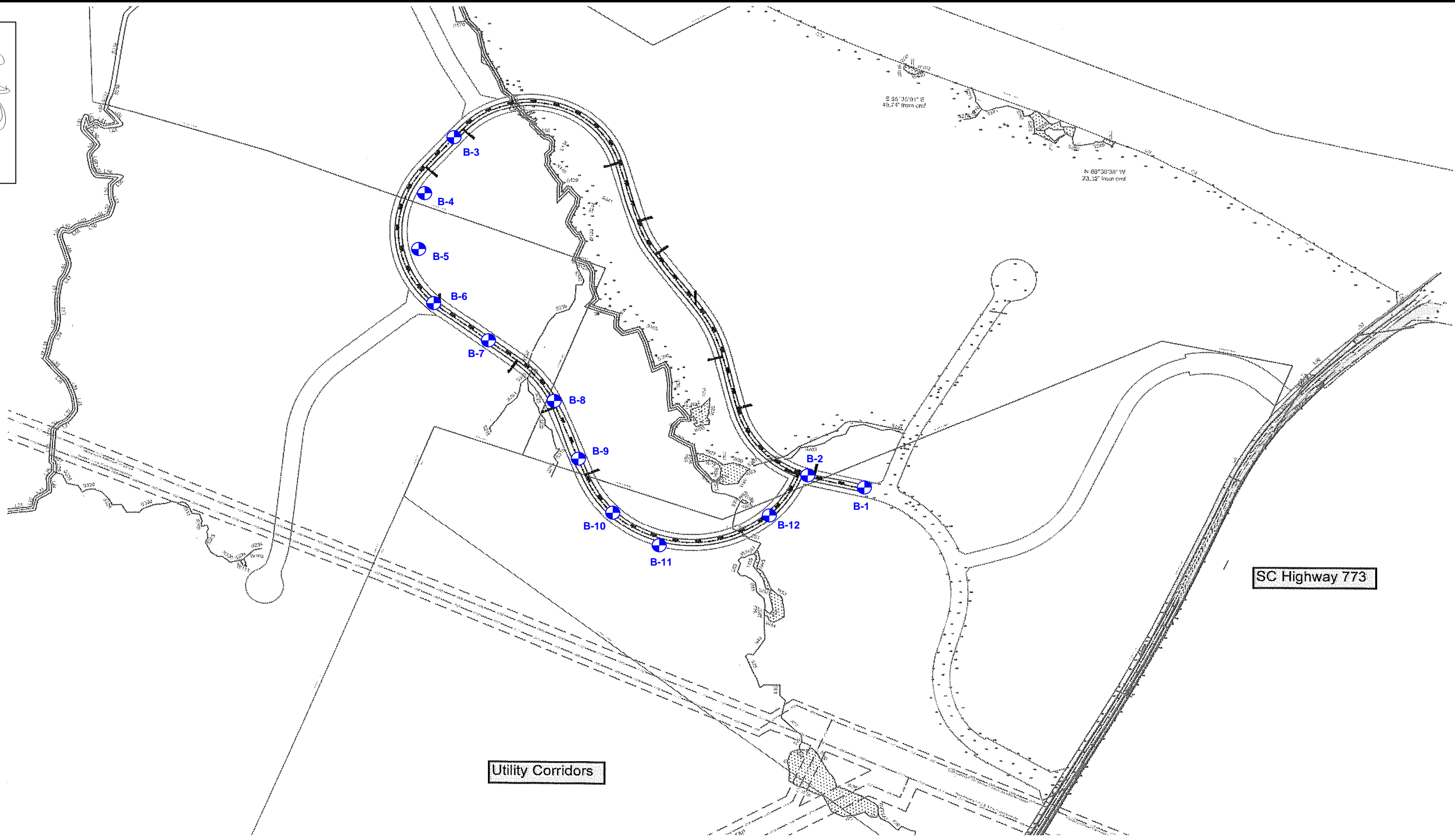
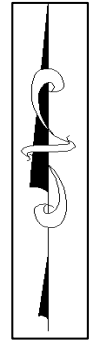


**SITE VICINITY MAP**  
 Mid-Carolina Commerce Park  
 Newberry County, South Carolina

JOB NO. 1611-09-106

FIGURE NO:  
**1**





 **APPROXIMATE BORING LOCATION**

**SOURCE:** Alliance Consulting Engineers, Inc.  
**DRAWING:** Phase IIA and III Roadway 3.24.09.dwg

SCALE:	NTS
CHECKED BY:	JTP
DRAWN BY:	MQ
DATE:	4/24/2009



**BORING LOCATION PLAN**

Mid-Carolina Commerce Park Phase IIA & III Roadway  
Newberry County, South Carolina

JOB NO. 1611-09-106

FIGURE NO.

**2**

## SUMMARY OF EXPLORATION PROCEDURES

### **Layout and Access to Boring Locations**

Layout Plan – S&ME was provided with a scaled sketch of the site in state-plane coordinates indicating the location of the proposed roadway alignment prior to mobilization to the site.

Staking of Borings - S&ME laid out the borings with a hand-held Global Positioning System (GPS) device prior to commencement of field work. The device used is considered accurate within 1 meter of the true coordinate. Boring locations were marked in the field with small colored flags with the boring numbers inscribed. Boring locations indicated on the attached “Boring Location Plan” must be considered as approximate.

Clearing – A track mounted bulldozer was utilized to provide access to staked boring locations in heavily vegetated terrain. Clearing to the staked borings was done by a locally subcontracted machine and operator, who followed direction of the Engineer. The operator attempted to clear small brush and saplings to the minimum extent possible consistent with passage of the equipment. He did not attempt to topple or fell large trees or snags, nor did he attempt to strip or grub the surface. Felled vegetation was pushed to the side of the path to allow equipment to pass but the vegetation was not stacked or burned.

Boring Access – Borings were accessed using an all-terrain tractor mounted drill rig.

### **Boring and Sampling**

Soil Test Boring with Hollow-Stem Auger – Soil sampling and penetration testing were performed in general accordance with ASTM D1586, “*Standard Test Method for Penetration Test and Split Barrel Sampling of Soils*”. At regular intervals, soil samples were obtained with a standard 1.4 inch I.D., two-inch O.D., split barrel sampler. The sampler was first seated six inches to penetrate any loose cuttings, and then driven an additional 12 inches with blows of a 140-pound hammer falling approximately 30 inches. The number of hammer blows required to drive the sampler through the two final six inch increments was recorded as the penetration resistance (SPT N) value. The N-value, when properly interpreted by qualified professional staff, is an index of the soil strength and foundation support capability.

Borehole Closure – Following collection of relevant geotechnical data, boreholes were filled by slowly pouring auger cuttings into the open hole such that minimal “bridging” of the material occurred in the hole. Backfilling of the upper two feet of each hole was tamped as heavily as possible with a shovel handle or other hand held equipment, and the backfill crowned to direct rainfall away on the surface.

### **Laboratory Testing**

Recovered disturbed and undisturbed samples and the drillers’ field logs were transported to the laboratory where they were examined by the geotechnical engineer. Selected samples representative of certain groups of soils were subjected to simple classification tests by hand



or other simple means. Other samples were tested in the laboratory to determine their strength or classification.

Examination of Recovered Soil Samples – Soil samples and field boring records were reviewed in the laboratory by the geotechnical engineer. Soils were classified in general accordance with the visual-manual method described in ASTM D 2488, “*Standard Practice for Description and Identification of Soils (Visual-Manual Method)*”. The geotechnical engineer also prepared the final boring records enclosed with this report.

Moisture Content Testing of Soil Samples by Oven Drying – Moisture content was determined in general conformance with the methods outlined in ASTM D 2216, “*Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil or Rock by Mass.*”

Liquid and Plastic Limits Testing – Atterberg limits of the soils was determined generally following the methods described by ASTM D 4318, “*Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.*” In current engineering usage, the *liquid limit* of a soil is defined as the moisture content, in percent, marking the upper limit of viscous flow and the boundary with a semi-liquid state. The *plastic limit* defines the lower limit of plastic behavior, above which a soil behaves plastically below which it retains its shape upon drying. The *plasticity index* (PI) is the range of water content over which a soil behaves plastically. Numerically, the PI is the difference between liquid limit and plastic limit values.

Percent Fines Determination of Samples – A selected specimen of soils was washed over a No. 200 sieve after being thoroughly mixed and dried. This test was conducted in general accordance with ASTM D 1140, “*Standard Test Method for Amount of Material Finer Than the No. 200 Sieve.*”


Compaction Tests of Soils Using Standard Effort – Soil placed as engineering fill is compacted to a dense state to obtain satisfactory engineering properties. Laboratory compaction tests provide the basis for determining the percent compaction and water content needed to achieve the required engineering properties, and for controlling construction to assure the required compaction and water contents are achieved. Test procedures generally followed those described by ASTM D 698, “*Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 lbf/ft<sup>3</sup>).*”

Laboratory California Bearing Ratio Tests of Compacted Samples – This method is used to evaluate the potential strength of subgrade, subbase, and base course material, including recycled materials, for use in roadway pavements. Laboratory CBR tests were run in general accordance with the procedures laid out in ASTM D 1883, “*Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.*”

# LEGEND TO SOIL CLASSIFICATION AND SYMBOLS




## SOIL TYPES

(Shown in Graphic Log)

	Fill
	Asphalt
	Concrete
	Topsoil
	Gravel
	Sand
	Silt
	Clay
	Organic
	Silty Sand
	Clayey Sand
	Sandy Silt
	Clayey Silt
	Sandy Clay
	Silty Clay
	Partially Weathered Rock
	Cored Rock

## WATER LEVELS

(Shown in Water Level Column)

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

## CONSISTENCY OF COHESIVE SOILS

<u>CONSISTENCY</u>	<u>STD. PENETRATION RESISTANCE BLOWS/FOOT</u>
Very Soft	0 to 2
Soft	3 to 4
Firm	5 to 8
Stiff	9 to 15
Very Stiff	16 to 30
Hard	31 to 50
Very Hard	Over 50

## RELATIVE DENSITY OF COHESIONLESS SOILS

<u>RELATIVE DENSITY</u>	<u>STD. PENETRATION RESISTANCE BLOWS/FOOT</u>
Very Loose	0 to 4
Loose	5 to 10
Medium Dense	11 to 30
Dense	31 to 50
Very Dense	Over 50

## SAMPLER TYPES

(Shown in Samples Column)

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

## TERMS

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

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

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

DATE DRILLED: <b>4/9/2009</b>	ELEVATION: <b>462</b>	<b>NOTES:</b> Safety hammer. CL station 19+00
DRILLING METHOD: <b>3/4" H.S.A.</b>	BORING DEPTH: <b>15</b>	
LOGGED BY: <b>MQ</b>	WATER LEVEL: <b>Not encountered at time of boring.</b>	
DRILLER: <b>S&amp;ME</b>	DRILL RIG:	

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO. / SAMPLE TYPE	STANDARD PENETRATION TEST DATA (blows/ft)					N VALUE	
						10	20	30	60	80		
		Approximately 2 inches of topsoil.										
		<b>SANDY LEAN CLAY (CL)</b> - mostly low to medium plasticity fines, little fine sands, trace of fine roots, moist, reddish-brown, stiff.			1							9
5		- reddish-brown, trace of black, very stiff.		457.0	2							17
		<b>SILTY SAND (SM)</b> - mostly fine to medium sands, some low plasticity fines, moist, tan, brown, medium dense.			3							20
10		- brown.		452.0	4							22
		- tan, gray.			5							22
15		BORING TERMINATED AT 15 FEET.		447.0								

BORING LOG: MID-CAROLINA LOG.GPJ WITH CPT.GDT 4/24/09

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3. STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.
4. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.



DATE DRILLED: <b>4/9/2009</b>	ELEVATION: <b>446</b>	NOTES: <b>Safety hammer.</b> <b>CL station 21+50</b>
DRILLING METHOD: <b>3/4" H.S.A.</b>	BORING DEPTH: <b>10.5</b>	
LOGGED BY: <b>MQ</b>	WATER LEVEL: <b>Not encountered at time of boring.</b>	
DRILLER: <b>S&amp;ME</b>	DRILL RIG:	


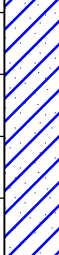
DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SAMPLE TYPE	STANDARD PENETRATION TEST DATA (blows/ft)					N VALUE
							10	20	30	60	80	
	Approximately 2 inches of topsoil.											
	<b>SANDY LEAN CLAY (CL)</b> - mostly low plasticity fines, some fine to medium sands, dry, brown, very stiff.				1							9
5	<b>SILTY SAND (SM)</b> - mostly fine sands, little low plasticity fines, micaceous, moist, brown, medium dense.			441.0	2							26
	No Recovery				3							50/0"
	<b>PARTIALLY WEATHERED ROCK</b> sampled as <b>SILTY SAND (SM)</b> - mostly fine sands, little low plasticity fines, dry, brown, very dense.				4							50/4"
10		BORING TERMINATED AT 10 FEET.		436.0								

BORING LOG MID-CAROLINA LOG.GPJ WITH CPT.GDT 4/24/09

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PROJECT: <b>Mid-Carolina Commerce Park Phase IIA and III Road Newberry County, SC 1611-09-106</b>		<b>BORING LOG B-3</b>										
DATE DRILLED: <b>4/8/2009</b>		ELEVATION: <b>403</b>		NOTES: <b>Safety hammer. CL station 48+00</b>								
DRILLING METHOD: <b>3/4" H.S.A.</b>		BORING DEPTH: <b>5</b>										
LOGGED BY: <b>MQ</b>		WATER LEVEL: <b>Not encountered at time of boring.</b>										
DRILLER: <b>S&amp;ME</b>		DRILL RIG:										
DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO. SAMPLE TYPE	STANDARD PENETRATION TEST DATA (blows/ft)					N VALUE	
						10	20	30	60	80		
		Approximately 2 inches of topsoil.										
		<b>SANDY CLAY (CL)</b> - mostly low to medium plasticity fines, some fine to medium sands, trace of fine roots, moist, reddish-brown, firm.  - tan, brown, very stiff.			1 2							8 29
5		BORING TERMINATED AT 5 FEET.		398.0								

BORING LOG: MID-CAROLINA LOG.GPJ WITH CPT.GDT 4/24/09

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DATE DRILLED: <b>4/8/2009</b>	ELEVATION: <b>426</b>	NOTES: <b>Safety hammer.</b> <b>Offset 80 feet left at station 51+00</b>
DRILLING METHOD: <b>3/4" H.S.A.</b>	BORING DEPTH: <b>10</b>	
LOGGED BY: <b>MQ</b>	WATER LEVEL: <b>Not encountered at time of boring.</b>	
DRILLER: <b>S&amp;ME</b>	DRILL RIG:	

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO. SAMPLE TYPE	STANDARD PENETRATION TEST DATA (blows/ft)					N VALUE	
						10	20	30	60	80		
		Approximately 2 inches of topsoil.										
		<b>CLAYEY SAND (SC)</b> - mostly fine to medium sands, some low plasticity fines, wet, tan, reddish-brown, very loose.			1							4
5		<b>PARTIALLY WEATHERED ROCK</b> sampled as <b>SILTY SAND (SM)</b> - mostly fine sands, little low plasticity fines, dry, tan, gray, very dense.  - few fine to medium quartz gravel, white.		421.0	2							50/4"
		No Recovery			3							50/4"
10		BORING TERMINATED AT 10 FEET.		416.0	4							50/0"

BORING LOG MID-CAROLINA LOG.GPJ WITH CPT.GDT 4/24/09

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DATE DRILLED: <b>4/8/2009</b>	ELEVATION: <b>448</b>	NOTES: <b>Safety hammer. Offset 80 feet left at station 54+00</b>
DRILLING METHOD: <b>3/4" H.S.A.</b>	BORING DEPTH: <b>10.5</b>	
LOGGED BY: <b>MQ</b>	WATER LEVEL: <b>Not encountered at time of boring.</b>	
DRILLER: <b>S&amp;ME</b>	DRILL RIG:	

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO. SAMPLE TYPE	STANDARD PENETRATION TEST DATA (blows/ft)					N VALUE	
						10	20	30	60	80		
0 - 2		Approximately 2 inches of topsoil.										
2 - 5		<b>SANDY LEAN CLAY (CL)</b> - mostly low plasticity fines, some fine to medium sands, trace of fine roots, wet, brown, gray, trace of reddish-brown, firm.  - dry, brown, gray, hard.		443.0	1 [ ]							6
5 - 8					2 [ ]							34
8 - 10		<b>PARTIALLY WEATHERED ROCK</b> sampled as <b>SILTY SAND (SM)</b> - mostly fine sands, little low plasticity fines, dry, gray, white, brown, very dense.  - tan, brown.			3 [ ]							50/2"
10 - 10.5				438.0	4 [ ]							50/3"
10.5 - 10.5		AUGER REFUSAL AT 10.5 FEET.										

BORING LOG MID-CAROLINA LOG.GPJ WITH CPT.GDT 4/24/09

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DEPTH (feet)		MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SAMPLE TYPE	STANDARD PENETRATION TEST DATA (blows/ft)					N VALUE
GRAPHIC LOG							10	20	30	60	80	
		Approximately 3 inches of topsoil.										
		<b>SANDY LEAN CLAY (CL)</b> - mostly low plasticity fines, little fine to medium sands, moist, reddish-brown, stiff.			1							10
5		<b>SANDY SILT (ML)</b> - mostly low plasticity fines, some fine to medium sands, moist, tan, brown, very stiff.		439.0	2							23
		- brown, trace of black.			3							22
		- brown, tan, trace of black, hard.			4							43
10		BORING TERMINATED AT 10 FEET.		434.0								

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BORING LOG MID-CAROLINA LOG.GPJ WITH CPT.GDT 4/24/09



PROJECT: <b>Mid-Carolina Commerce Park Phase IIA and III Road Newberry County, SC 1611-09-106</b>		<b>BORING LOG B-7</b>										
DATE DRILLED: <b>4/8/2009</b>		ELEVATION: <b>444</b>		NOTES: <b>Safety hammer. CL station 60+00</b>								
DRILLING METHOD: <b>3/4" H.S.A.</b>		BORING DEPTH: <b>10</b>										
LOGGED BY: <b>MQ</b>		WATER LEVEL: <b>Not encountered at time of boring.</b>										
DRILLER: <b>S&amp;ME</b>		DRILL RIG:										
DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO. SAMPLE TYPE	STANDARD PENETRATION TEST DATA (blows/ft)					N VALUE	
						10	20	30	60	80		
		Approximately 2 inches of topsoil.										
		<b>SILTY SAND (SM)</b> - mostly fine to medium sands, little low plasticity fines, dry, tan, brown, dense.			1							36
5		- gray, very dense.		439.0	2							68
		<b>PARTIALLY WEATHERED ROCK</b> sampled as <b>SILTY SAND (SM)</b> - mostly fine sands, little low plasticity fines, dry, brown, gray, very dense.			3							50/ 5"
		<b>SILTY SAND (SM)</b> - mostly fine sands, little low plasticity fines, dry, tan, very dense.			4							83
10		BORING TERMINATED AT 10 FEET.		434.0								

BORING LOG MID-CAROLINA LOG.GPJ WITH CPT.GDT 4/24/09

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4. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.



PROJECT: <b>Mid-Carolina Commerce Park Phase IIA and III Road Newberry County, SC 1611-09-106</b>		<b>BORING LOG B-8</b>										
DATE DRILLED: <b>4/8/2009</b>		ELEVATION: <b>439</b>		NOTES: <b>Safety hammer. CL station 64+00</b>								
DRILLING METHOD: <b>3/4" H.S.A.</b>		BORING DEPTH: <b>5</b>										
LOGGED BY: <b>MQ</b>		WATER LEVEL: <b>Not encountered at time of boring.</b>										
DRILLER: <b>S&amp;ME</b>		DRILL RIG:										
DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO. SAMPLE TYPE	STANDARD PENETRATION TEST DATA (blows/ft)					N VALUE	
						10	20	30	60	80		
		Approximately 2 inches of topsoil.  <b>PARTIALLY WEATHERED ROCK</b> sampled as <b>SILTY SAND (SM)</b> - mostly fine to medium sands, little low plasticity fines, dry, orange, tan, very dense.  - No Recovery			1 2							50/4" 50/0"
5		BORING TERMINATED AT 5 FEET.		434.0								

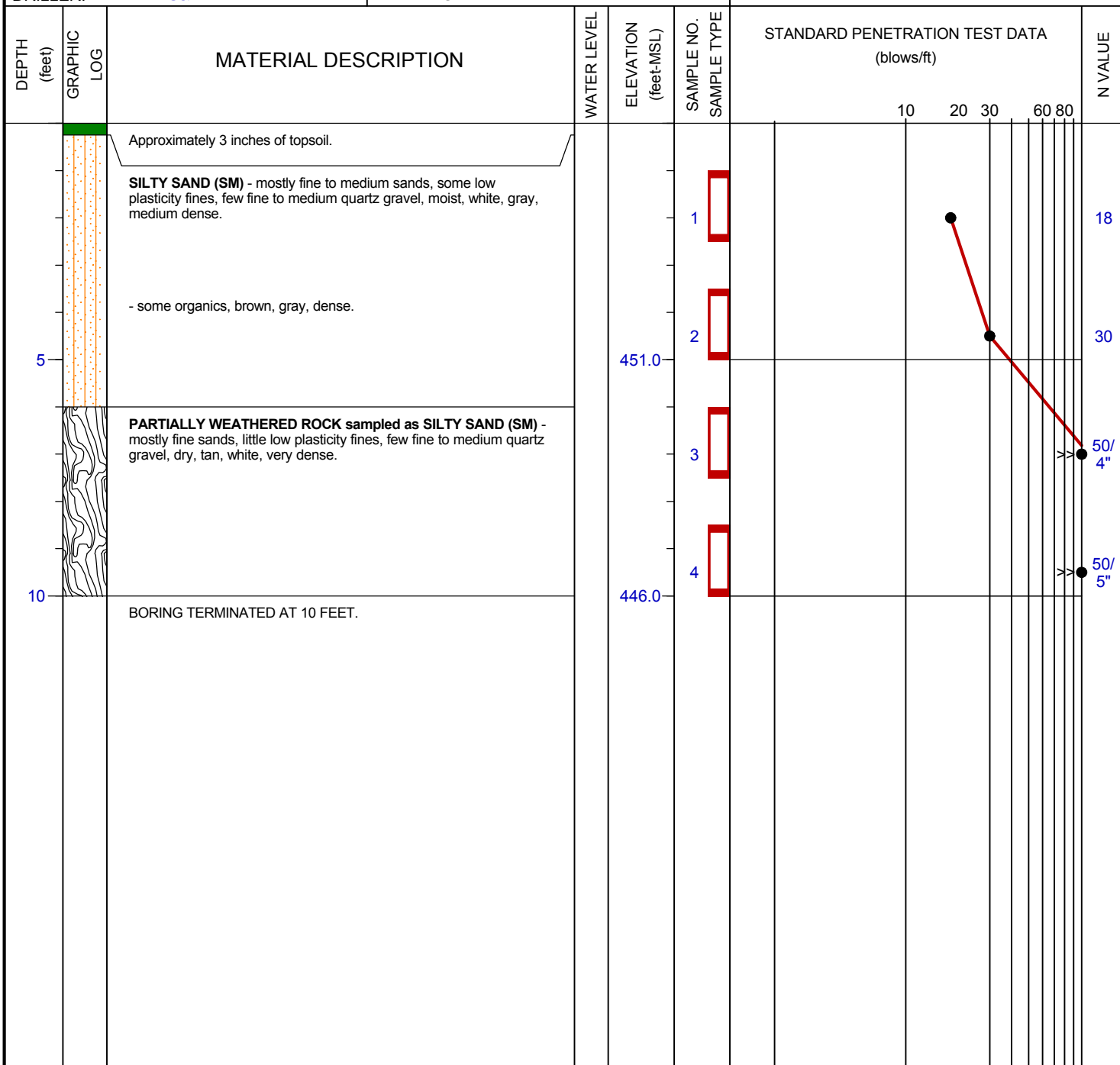
BORING LOG MID-CAROLINA LOG.GPJ WITH CPT.GDT 4/24/09

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DATE DRILLED: <b>4/8/2009</b>	ELEVATION: <b>456</b>	NOTES: <b>Safety hammer.</b> <b>CL station 67+00</b>
DRILLING METHOD: <b>3/4" H.S.A.</b>	BORING DEPTH: <b>10</b>	
LOGGED BY: <b>MQ</b>	WATER LEVEL: <b>Not encountered at time of boring.</b>	
DRILLER: <b>S&amp;ME</b>	DRILL RIG:	



BORING LOG: MID-CAROLINA LOG.GPJ WITH CPT.GDT 4/24/09

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4. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.



DATE DRILLED: <b>4/8/2009</b>	ELEVATION: <b>469</b>	NOTES: <b>Safety hammer.</b> <b>CL station 70+00</b>
DRILLING METHOD: <b>3/4" H.S.A.</b>	BORING DEPTH: <b>15</b>	
LOGGED BY: <b>MQ</b>	WATER LEVEL: <b>Not encountered at time of boring.</b>	
DRILLER: <b>S&amp;ME</b>	DRILL RIG:	

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO. SAMPLE TYPE	STANDARD PENETRATION TEST DATA (blows/ft)					N VALUE
						10	20	30	60	80	
		Approximately 2 inches of topsoil.									
5		<b>SANDY ELASTIC SILT (MH)</b> - mostly medium to high plasticity fines, little fine sands, moist, reddish-brown, trace of white, stiff.  - very stiff.  - reddish-brown, white.		464.0	1 2 3						13 18 27 31 21
10		<b>SILTY SAND (SM)</b> - mostly fine sands, little low plasticity fines, moist, tan, trace of reddish-brown, dense.  - brown, trace of black, medium dense.		459.0	4						
15		BORING TERMINATED AT 15 FEET.		454.0	5						

BORING LOG: MID-CAROLINA LOG.GPJ WITH CPT.GDT 4/24/09

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DATE DRILLED: <b>4/8/2009</b>	ELEVATION: <b>463</b>	<b>NOTES:</b> Safety hammer. Offset 50 feet right at station 72+50
DRILLING METHOD: <b>3/4" H.S.A.</b>	BORING DEPTH: <b>15</b>	
LOGGED BY: <b>MQ</b>	WATER LEVEL: <b>Not encountered at time of boring.</b>	
DRILLER: <b>S&amp;ME</b>	DRILL RIG:	

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO. SAMPLE TYPE	STANDARD PENETRATION TEST DATA (blows/ft)					N VALUE	
						10	20	30	60	80		
		Approximately 2 inches of topsoil.										
		<b>SANDY LEAN CLAY (CL)</b> - mostly low plasticity fines, little fine sands, moist, reddish-brown, stiff.  - very stiff.			1							15
5				458.0	2							38
		<b>SILTY SAND (SM)</b> - mostly fine sands, some low plasticity fines, micaceous, moist, brown, medium dense.  - tan, brown, trace of white.			3							22
10				453.0	4							23
		- brown, trace of black.			5							25
15		BORING TERMINATED AT 15 FEET.		448.0								

BORING LOG: MID-CAROLINA LOG.GPJ WITH CPT.GDT 4/24/09

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PROJECT:		Mid-Carolina Commerce Park Phase IIA and III Road Newberry County, SC 1611-09-106			BORING LOG		B-12					
DATE DRILLED: 4/9/2009		ELEVATION: 427			NOTES: Safety hammer. CL station 77+50							
DRILLING METHOD: 3/4" H.S.A.		BORING DEPTH: 5										
LOGGED BY: MQ		WATER LEVEL: Not encountered at time of boring.										
DRILLER: S&ME		DRILL RIG:										
DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO. SAMPLE TYPE	STANDARD PENETRATION TEST DATA (blows/ft)					N VALUE	
						10	20	30	60	80		
5		SANDY LEAN CLAY (CL) - mostly low to medium plasticity fines, little fine to medium sands, moist, gray, reddish-brown, tan, stiff.			1							15
		SILTY SAND (SM) - mostly fine to medium sands, some low plasticity fines, moist, orangish-brown, gray, dense.		422.0	2							43
		BORING TERMINATED AT 5 FEET.										

BORING LOG: MID-CAROLINA LOG.GPJ WITH CPT.GDT 4/24/09

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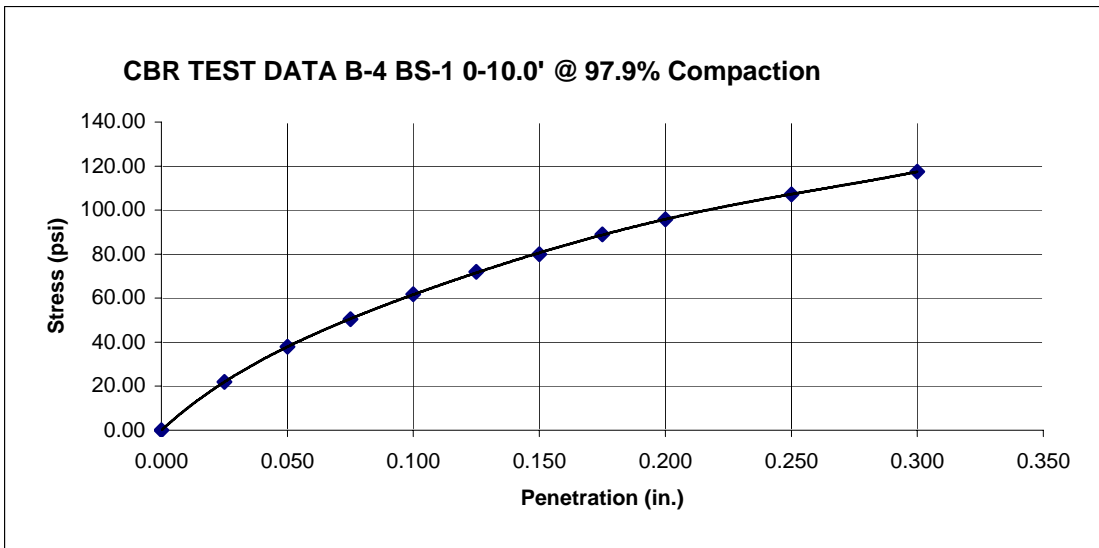




**CBR TEST DATA SHEET ASTM NO. D 1883-94**

<b>JOB NAME</b>	Mid-Carolina Roadway Phase IIA & III Road	<b>Description</b>	Clayey Sand (SC)
<b>JOB NO.</b>	1611-09-106	<b>Sample</b>	B-4
<b>TEST</b>	1	<b>Blows</b>	36
<b>MAX DRY DENSITY</b>	119 PCF	<b>WEIGHT OF SOIL + MOLD</b>	44.505 lb.
<b>OPT MOISTURE CONTENT</b>	12.0%	<b>WEIGHT OF MOLD</b>	34.712 lb.
<b>% H2O after soak</b>	15.8%	<b>WEIGHT OF WET SOIL</b>	9.793 lb.
<b>CBR PUNCH AREA</b>	3.1416 Sq. in.	<b>WET UNIT WEIGHT</b>	130.7 pcf
<b>CBR SERIAL NO</b>	459	<b>% H2O pre soak</b>	12.2%
<b>LOAD RING RATIO</b>	1.7851	<b>DRY UNIT WEIGHT</b>	116.5 pcf
<b>LOAD RING CONSTANT</b>	2.342	<b>% COMPACTION</b>	97.9%
<b>PERFORMED BY</b>	BU	<b>% WATER ABSORBED</b>	3.6%
		<b>PERCENT SWELL</b>	0.7 %

Actual Deformation (in)	Load Dial Reading	Stress (psi)	CBR	Corrected Stress	Corrected CBR
0	0	0.00			
0.025	40	21.98			
0.05	68	37.89			
0.075	90	50.39			
0.1	110	61.76	6.2	0	6
0.125	128	71.99			
0.15	142	79.94			
0.175	158	89.03			
0.2	170	95.85	6.4	0	6
0.25	190	107.22			
0.3	208	117.44			





## Particle Size Analysis of Soils



ASTM D 422

**Project #:** 1611-09-106

Test Date(s): 4/16/09-4/17/09

**Project Name:** Mid- Carolina Commerce Park Phase IIA & III Road

Report Date: 4/17/09

Client Name: Alliance Consulting Engineers, Inc.

Client Address: P.O. Box 8147, Columbia, South Carolina 29202

Boring #: 4

Sample #: BS-1

Sample Date:

Location: B-4

Elevation:

0-10.0'

Sample Description: Clayey Sand (SC) low plasticity, fine to medium sand, light brown

Particle Size Analysis / Without Hydrometer Analysis			Moisture Content		Natural
				Tare #	116
	Tare Number		A	Tare Weight	0.00
A	Tare Weight		B	Wet Weight + Tare Wt.	137.33
B	Total Sample Dry Wt. + Tare Wt.		C	Dry Weight + Tare Wt.	124.02
C	Total Sample Dry Weight (B-A)		D	Water Wt. (B-C)	13.31
D	Total Sample Wt. After #200 Wash		E	Dry Wt.(C-A)	124.02
E	Percent Passing #200 (1-D/C)x100		Moisture Content (100 x D/E) (%)		10.7%

<b>Notes:</b> Maximum Particle Size	Gravel < 75 mm and > 4.75 mm (#4)
Apparent Relative Density	Coarse Sand < 4.75 mm and >2.00 mm (#10)
Liquid Limit                      Fineness Modulus	Medium Sand < 2.00 mm and > 0.425 mm (#40)
Plastic Limit                      Cu = D60/D10:	Fine Sand < 0.425 mm and > 0.075 mm (#200)
Plastic Index                      Cc =(D30) <sup>2</sup> / (D10xD60):	% Silt and Clay < 0.075 mm
	Description of Sand & Gravel      Rounded <input checked="" type="checkbox"/> Angular <input checked="" type="checkbox"/>
	Hard & Durable <input checked="" type="checkbox"/> Soft <input type="checkbox"/> Weathered & Friable <input type="checkbox"/>

Organic Content

D10 =

D30 =

D60 =

D50 =

D90 =

ASTM D 422: Particle Size Analysis of Soils

*Hydrometer portion of test method not utilized.*

ASTM D 421: Dry Preparation of Soil Samples

ASTM D 854: Specific Gravity of Soils

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technician Name:

Brian Urban

\_\_\_\_\_  
Certification #

Technical Responsibility:

Melissa Quinton

\_\_\_\_\_  
Signature

Staff Professional

\_\_\_\_\_  
Position

# Moisture - Density Report

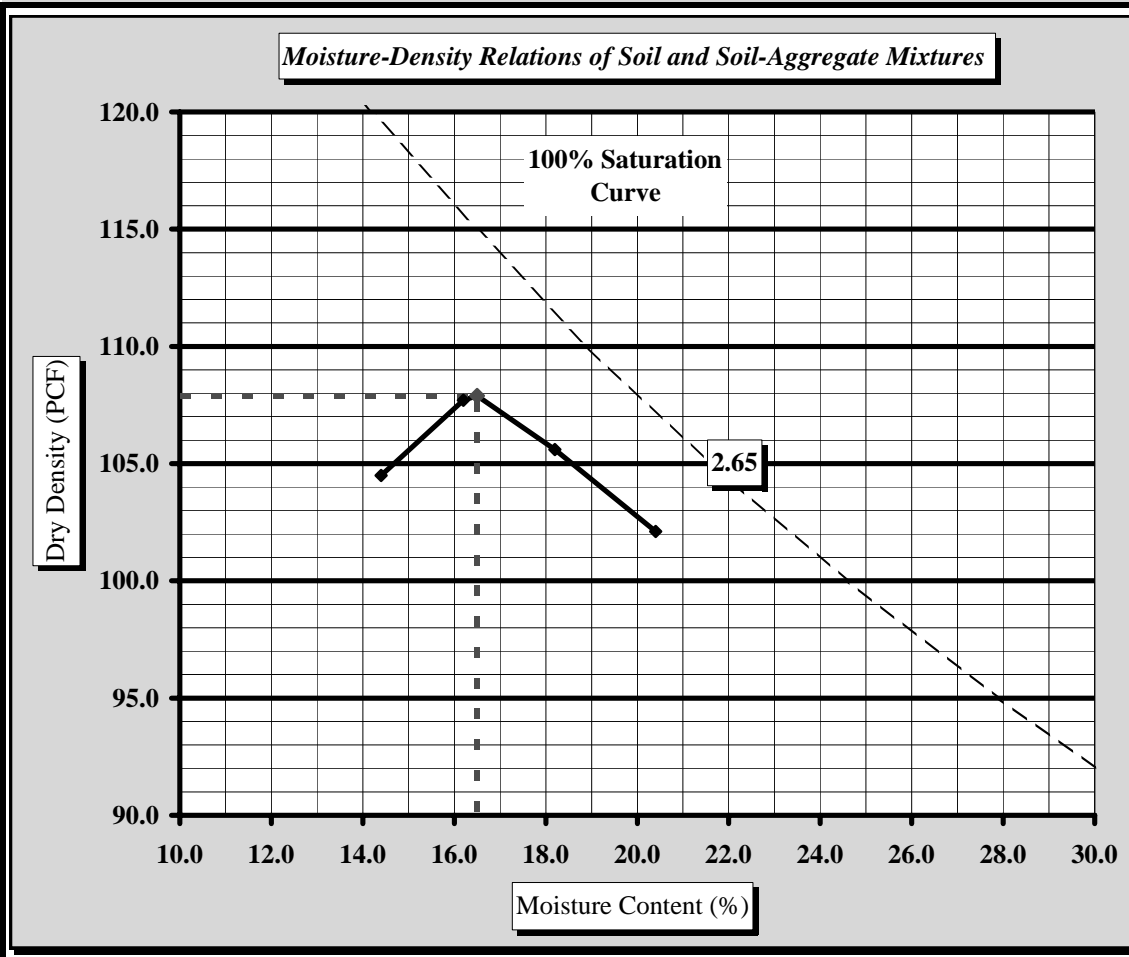


Quality Assurance

S&ME, Inc. 134 Suber Road, Columbia, SC 29210

S&ME Project #:	1611-09-106	Report Date:	4/15/09
Project Name:	Mid-Carolina Commerce Park Phase IIA & III Road	Test Date(s):	4/14/09
Client Name:	Alliance Consulting Engineers, Inc.		
Client Address:	P.O. Box 8147, Columbia, South Carolina 29202		
Boring #:	9	Sample #:	Bulk 2
Location:	B-9	Sample Date:	4/10/2009
		Depth:	0-10.0
Sample Description:	Sandy Lean Clay (CL) low plasticity, fine to medium sand, brown		

**Maximum Dry Density 107.9 PCF. Optimum Moisture Content 16.5%**  
 ASTM D 698 -- Method A



<b>Soil Properties</b>	
Natural Moisture Content	
Specific Gravity of Soil	
Liquid Limit	
Plastic Limit	
Plastic Index	
<b>% Passing</b>	
<b>Oversize Fraction</b>	
Bulk Gravity	
% Moisture	
% Oversize	
MDD	#DIV/0!
Opt. MC	#DIV/0!

Moisture-Density Curve Displayed: Fine Fraction  Corrected for Oversize Fraction (ASTM D 4718)   
 Sieve Size used to separate the Oversize Fraction: #4 Sieve  3/8 inch Sieve  3/4 inch Sieve   
 Mechanical Rammer  Manual Rammer  Moist Preparation  Dry Preparation

**References / Comments / Deviations:**

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass  
 ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

Technical Responsibility

Signature

Position

Date

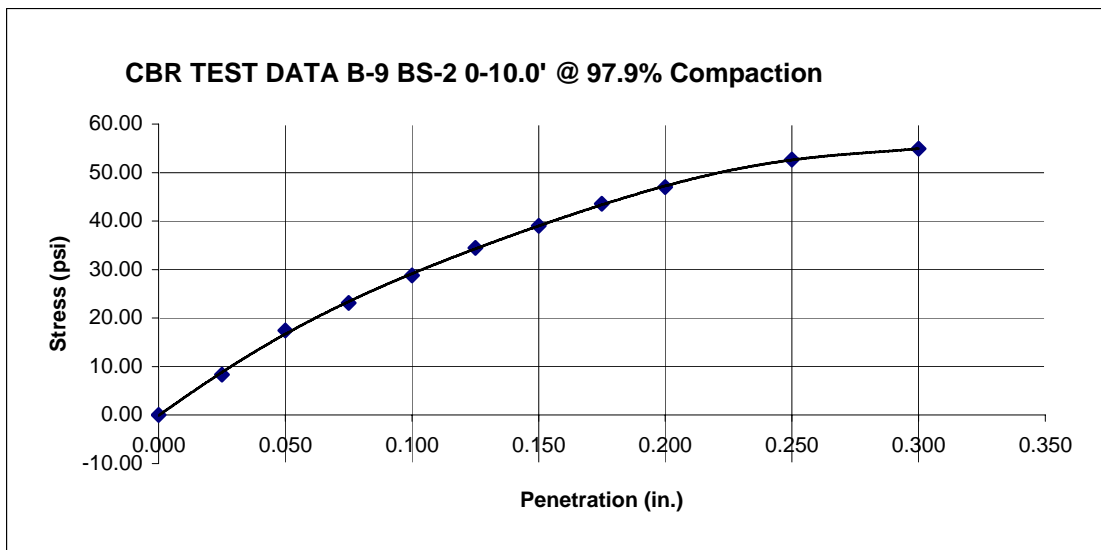
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**CBR TEST DATA SHEET ASTM NO. D 1883-94**

<b>JOB NAME</b>	Mid-Carolina Roadway Phase IIA & III Road	<b>Description</b>	Sandy Lean Clay (CL)
<b>JOB NO.</b>	1611-09-106	<b>Sample</b>	B-9
<b>TEST</b>	1	<b>Blows</b>	38
<b>MAX DRY DENSITY</b>	107.9 PCF	<b>WEIGHT OF SOIL + MOLD</b>	44.117 lb.
<b>OPT MOISTURE CONTENT</b>	16.5%	<b>WEIGHT OF MOLD</b>	34.89 lb.
<b>% H2O after soak</b>	20.8%	<b>WEIGHT OF WET SOIL</b>	9.227 lb.
<b>CBR PUNCH AREA</b>	3.1416 Sq. in.	<b>WET UNIT WEIGHT</b>	123.2 pcf
<b>CBR SERIAL NO</b>	459	<b>% H2O pre soak</b>	16.6%
<b>LOAD RING RATIO</b>	1.7851	<b>DRY UNIT WEIGHT</b>	105.7 pcf
<b>LOAD RING CONSTANT</b>	2.342	<b>% COMPACTION</b>	97.9%
<b>PERFORMED BY</b>	BU	<b>% WATER ABSORBED</b>	4.2%
		<b>PERCENT SWELL</b>	1.6 %

Actual Deformation (in)	Load Dial Reading	Stress (psi)	CBR	Corrected Stress	Corrected CBR
0	0	0.00			
0.025	16	8.35			
0.05	32	17.44			
0.075	42	23.12			
0.1	52	28.80	2.9	0	3
0.125	62	34.48			
0.15	70	39.03			
0.175	78	43.58			
0.2	84	46.98	3.1	0	3
0.25	94	52.67			
0.3	98	54.94			





# Particle Size Analysis of Soils



ASTM D 422

**Project #:** 1611-09-106

Test Date(s): 4/16/09-4/17/09

**Project Name:** Mid- Carolina Commerce Park Phase IIA & III Road

Report Date: 4/17/09

Client Name: Alliance Consulting Engineers, Inc.

Client Address: P.O. Box 8147, Columbia, South Carolina 29202

Boring #: 3

Sample #: 1

Sample Date:

Location: B-3

Elevation:

1.0'

Sample Description: Sandy Lean Clay (CL) low to medium plasticity, fine to medium sand, reddish-brown

Particle Size Analysis / Without Hydrometer Analysis			Moisture Content		Natural
				Tare #	6
	Tare Number	6.0	A	Tare Weight	0.00
A	Tare Weight	0.0	B	Wet Weight + Tare Wt.	233.21
B	Total Sample Dry Wt. + Tare Wt.	0.0	C	Dry Weight + Tare Wt.	192.34
C	Total Sample Dry Weight (B-A)	192.34	D	Water Wt. (B-C)	40.87
D	Total Sample Wt. After #200 Wash	93.62	E	Dry Wt.(C-A)	192.34
E	Percent Passing #200 (1-D/C)x100	51.3%		Moisture Content (100 x D/E) (%)	21.2%

<b>Notes:</b>	Maximum Particle Size	Gravel	< 75 mm and > 4.75 mm (#4)
	Apparent Relative Density	Coarse Sand	< 4.75 mm and > 2.00 mm (#10)
Liquid Limit	Fineness Modulus	Medium Sand	< 2.00 mm and > 0.425 mm (#40)
Plastic Limit	Cu = D60/D10:	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Plastic Index	Cc = (D30) <sup>2</sup> / (D10xD60):	% Silt and Clay	< 0.075 mm
		Description of Sand & Gravel	Rounded <input checked="" type="checkbox"/> Angular <input checked="" type="checkbox"/>
		Hard & Durable <input checked="" type="checkbox"/> Soft <input type="checkbox"/>	Weathered & Friable <input type="checkbox"/>

Organic Content

D10 =

D30 =

D60 =

D50 =

D90 =

ASTM D 422: Particle Size Analysis of Soils

*Hydrometer portion of test method not utilized.*

ASTM D 421: Dry Preparation of Soil Samples

ASTM D 854: Specific Gravity of Soils

ASTM D 4318: Liquid Limit, Plastic Limit, &amp; Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technician Name:

Brian Urban\_\_\_\_\_  
Certification #

Technical Responsibility:

Melissa Quinton\_\_\_\_\_  
SignatureStaff Professional\_\_\_\_\_  
Position

# Particle Size Analysis of Soils



ASTM D 422

**Project #:** 1611-09-106

**Test Date(s):** 4/16/09-4/17/09

**Project Name:** Mid- Carolina Commerce Park Phase IIA & III Road

**Report Date:** 4/17/09

**Client Name:** Alliance Consulting Engineers, Inc.

**Client Address:** P.O. Box 8147, Columbia, South Carolina 29202

**Boring #:** 6

**Sample #:** 4

**Sample Date:**

**Location:** B-6

**Elevation:**

8.5'

**Sample Description:** Sandy Silt (ML) low to medium plasticity, fine to medium sand, brown and yellow

Particle Size Analysis / Without Hydrometer Analysis			Moisture Content		Natural
			Tare #		5
	Tare Number	5.0	A	Tare Weight	0.00
A	Tare Weight	0.0	B	Wet Weight + Tare Wt.	239.34
B	Total Sample Dry Wt. + Tare Wt.	0.0	C	Dry Weight + Tare Wt.	193.72
C	Total Sample Dry Weight (B-A)	193.72	D	Water Wt. (B-C)	45.62
D	Total Sample Wt. After #200 Wash	93.93	E	Dry Wt.(C-A)	193.72
E	Percent Passing #200 (1-D/C)x100	51.5%	Moisture Content (100 x D/E) (%)		23.5%

<b>Notes:</b> Maximum Particle Size	Gravel < 75 mm and > 4.75 mm (#4)
Apparent Relative Density	Coarse Sand < 4.75 mm and >2.00 mm (#10)
Liquid Limit                      Fineness Modulus	Medium Sand < 2.00 mm and > 0.425 mm (#40)
Plastic Limit                      Cu = D60/D10:	Fine Sand < 0.425 mm and > 0.075 mm (#200)
Plastic Index                      Cc =(D30) <sup>2</sup> / (D10xD60):	% Silt and Clay < 0.075 mm
Description of Sand & Gravel      Rounded <input checked="" type="checkbox"/> Angular <input checked="" type="checkbox"/>	
Hard & Durable <input checked="" type="checkbox"/> Soft <input type="checkbox"/> Weathered & Friable <input type="checkbox"/>	

Organic Content

D10 =

D30 =

D60 =

D50 =

D90 =

ASTM D 422: Particle Size Analysis of Soils

*Hydrometer portion of test method not utilized.*

ASTM D 421: Dry Preparation of Soil Samples

ASTM D 854: Specific Gravity of Soils

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

**Technician Name:**

Brian Urban

\_\_\_\_\_  
Certification #

**Technical Responsibility:**

Melissa Quinton

\_\_\_\_\_  
Signature

Staff Professional

\_\_\_\_\_  
Position



## Liquid Limit, Plastic Limit, and Plastic Index

Project #: **1611-09-106**  
 Project Name: Mid-Carolina Commerce Park Phase IIA & III Road  
 Client Name: Alliance Consulting Engineers, Inc.  
 Client Address: P.O. Box 8147, Columbia, South Carolina 29202

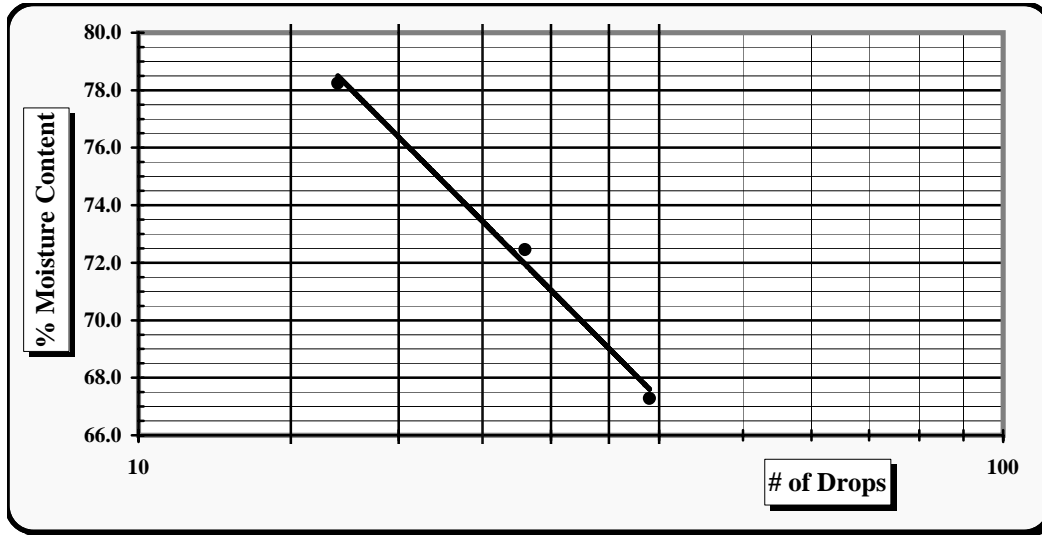
Report Date: 4/17/09  
 Test Date(s): 4/17/09

Boring #: 10 Sample #: 1 Sample Date:

Location: B-10 Elevation: 1.0'

Sample Description: Sandy Elastic Silt (MH) medium to high plasticity, fine to medium sand, brownish-red

Pan #	Test #	Liquid Limit						Plastic Limit		
		1	2	3	4	5	6	1	2	3
	Tare #	124	126	101				131	244	
A	Tare Weight	13.99	13.84	13.70				<b>13.56</b>	13.74	
B	Wet Soil Weight + A	25.95	25.55	25.56				17.65	18.18	
C	Dry Soil Weight + A	20.70	20.63	20.79				16.48	16.92	
D	Water Weight (B-C)	5.25	4.92	4.77				1.17	1.26	
E	Dry Soil Weight (C-A)	6.71	6.79	7.09				2.92	3.18	
F	% Moisture Content (D/E)*100	78.2%	72.5%	67.3%				40.1%	39.6%	
N	# OF DROPS	17	28	39				<i>Moisture Contents determined by ASTM D 2216</i>		
LL	LL = F * FACTOR									
Ave.	Average							39.8%		



N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes:

Special Sampling Methods:

Sample Preparation:	Wet Preparation <input type="checkbox"/>	Dry Preparation <input checked="" type="checkbox"/>	Air Dried <input checked="" type="checkbox"/>	NP, Non-Plastic <input type="checkbox"/>
Liquid limit Test:	Multipoint Method <input checked="" type="checkbox"/>	One-point Method <input type="checkbox"/>		Liquid Limit <u>73</u>
Classification:	ASTM D 2487 <input checked="" type="checkbox"/>	AASHTO M 145 <input type="checkbox"/>		Plastic Limit <u>40</u>
Liquid limit Test:	ASTM D 4318 <input checked="" type="checkbox"/>	AASHTO T 89 <input type="checkbox"/>		Plastic Index <u>33</u>
Plastic limit Test:	ASTM D 4318 <input checked="" type="checkbox"/>	AASHTO T 90 <input type="checkbox"/>		Group Symbol <u>MH</u>

Technician Name: Brian Urban \_\_\_\_\_  
Certification #

Technical Responsibility: Melissa Quinton \_\_\_\_\_  
Signature Staff Professional  
Position







## Liquid Limit, Plastic Limit, and Plastic Index

Project #: **1611-09-106**  
 Project Name: Mid-Carolina Commerce Park Phase IIA & III Road  
 Client Name: Alliance Consulting Engineers, Inc.  
 Client Address: P.O. Box 8147, Columbia, South Carolina 29202

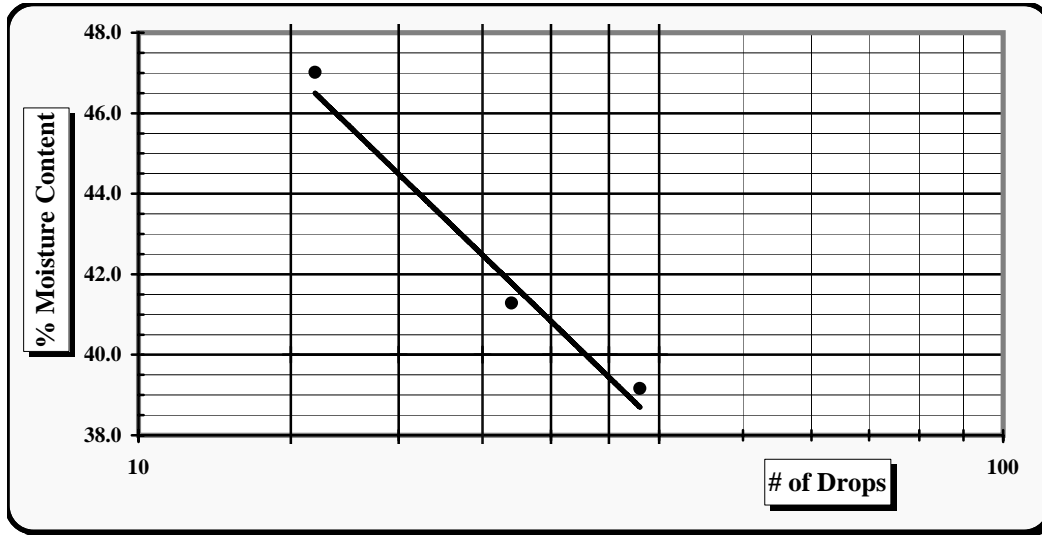
Report Date: 4/17/09  
 Test Date(s): 4/17/09

Boring #: 12 Sample #: 1 Sample Date:

Location: B-12 Elevation: 1.0'

Sample Description: Sandy Lean Clay (CL) low to med. plasticity, fine to medium sand, brownish-yellow

Pan #	Test #	Liquid Limit						Plastic Limit		
		1	2	3	4	5	6	1	2	3
	Tare #	140	230	142				109	144	
A	Tare Weight	13.71	13.79	13.78				<b>13.82</b>	13.79	
B	Wet Soil Weight + A	26.28	25.46	25.33				18.63	18.70	
C	Dry Soil Weight + A	22.26	22.05	22.08				17.78	17.84	
D	Water Weight (B-C)	4.02	3.41	3.25				0.85	0.86	
E	Dry Soil Weight (C-A)	8.55	8.26	8.30				3.96	4.05	
F	% Moisture Content (D/E)*100	47.0%	41.3%	39.2%				21.5%	21.2%	
N	# OF DROPS	16	27	38				<i>Moisture Contents determined by ASTM D 2216</i>		
LL	LL = F * FACTOR									
Ave.	Average							21.3%		



N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes:

Special Sampling Methods:

Sample Preparation:	Wet Preparation <input type="checkbox"/>	Dry Preparation <input checked="" type="checkbox"/>	Air Dried <input checked="" type="checkbox"/>	NP, Non-Plastic <input type="checkbox"/>
Liquid limit Test:	Multipoint Method <input checked="" type="checkbox"/>	One-point Method <input type="checkbox"/>		Liquid Limit <u>42</u>
Classification:	ASTM D 2487 <input checked="" type="checkbox"/>	AASHTO M 145 <input type="checkbox"/>		Plastic Limit <u>21</u>
Liquid limit Test:	ASTM D 4318 <input checked="" type="checkbox"/>	AASHTO T 89 <input type="checkbox"/>		Plastic Index <u>21</u>
Plastic limit Test:	ASTM D 4318 <input checked="" type="checkbox"/>	AASHTO T 90 <input type="checkbox"/>		Group Symbol <u>CL</u>

Technician Name: Brian Urban \_\_\_\_\_  
Certification #

Technical Responsibility: Melissa Quinton \_\_\_\_\_  
Signature Staff Professional  
Position



**SECTION 02 41 00  
DEMOLITION**

**PART 1 GENERAL**

**1.01 RELATED REQUIREMENTS**

- A. Section 01 70 00 - Execution Requirements.
- B. Section 31 10 00 – Site Preparation.
- C. Section 31 23 23.13 – Backfill and Compaction.
- D. Section 31 25 00 – Erosion and Sedimentation Controls.

**PART 2 PRODUCTS -- NOT USED**

**PART 3 EXECUTION**

**3.01 GENERAL PROCEDURES AND PROJECT CONDITIONS**

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
  - 1. Obtain required permits.
  - 2. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
  - 3. Provide, erect, and maintain temporary barriers and security devices.
  - 4. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
  - 5. Do not close or obstruct roadways or sidewalks without permit.
  - 6. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
  - 7. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.
- B. Do not begin removal until built elements to be salvaged or relocated have been removed.

- C. Protect existing structures and other elements that are not to be removed.
  - 1. Provide bracing and shoring.
  - 2. Prevent movement or settlement of adjacent structures.
  - 3. Stop work immediately if adjacent structures appear to be in danger.

### **3.02 DEBRIS AND WASTE REMOVAL**

- A. Remove debris, junk, and trash from site.
- B. Leave site in clean condition, ready for subsequent work.
- C. Clean up spillage and wind-blown debris from public and private lands.

### **3.03 MEASUREMENT AND PAYMENT**

- A. Payment will be made for work under this Section per the Contractor's bid for the related items listed in Specification Section 00 41 00 Bid Form.

**END OF SECTION**

## SECTION 03 10 00

### CONCRETE FORMING AND ACCESSORIES

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Formwork for cast-in place concrete, with shoring, bracing and anchorage.
- B. Form Accessories.
- C. Expansion and Contraction Joints with Accessories.
- D. Water Stops

##### 1.02 RELATED SECTIONS

- A. Section 03 30 00 - Cast-In-Place Concrete.

##### 1.03 REFERENCES

- A. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International; 2010.
- B. ACI 318 - Building Code Requirements for Reinforced Concrete and Commentary; American Concrete Institute International; 2011.
- C. ACI 347R - Guide to Formwork for Concrete; American Concrete Institute International; 2004.
- D. ACI 350R – Environmental engineering Concrete Structures; American Concrete institute International; 2004.
- E. ASME A17.1 - Safety Code for Elevators and Escalators; The American Society of Mechanical Engineers; 2010.
- F. PS 1 - Construction and Industrial Plywood; National Institute of Standards and Technology (Department of Commerce); 2012.
- G. AHA A135.4 (1995) Basic Hardboard
- H. ASTM A 1011/A 1011M (2003a) Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High Strength Low-Alloy and High-Strength Low-Alloy With Improved Formability
- I. ASTM A 109/A 109M (2003) Steel, Strip, Carbon (0.25 Maximum Percent), Cold-Rolled
- J. ASTM A 167 (1999) Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
- K. ASTM A 480/A 480M (2003b) General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip
- L. ASTM C 919 (2002) Use of Sealants in Acoustical Applications
- M. ASTM C 920 (2008) Elastomeric Joint Sealants
- N. ASTM D 1751 (1999) Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)

- O. ASTM D 1752 (1984; R 1996e1) Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
- P. ASTM D 2628 (1991; R 1998) Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements
- Q. ASTM D 2835 (1989; R 1998) Lubricant for Installation of Preformed Compression Seals in Concrete Pavements
- R. ASTM D 4 (1986; R 1998) Bitumen Content
- S. ASTM D 412 (1998a; R 2002e1) Vulcanized Rubber and Thermoplastic Elastomers – Tension
- T. ASTM D 471 (1998e1) Rubber Property - Effect of Liquids
- U. ASTM D 5249 (1995; R 2000) Backer Material for Use with Cold-and Hot-Applied Joint Sealants in Portland-Cement Concrete and Asphalt Joints
- V. ASTM D 5329 (1996) Sealants and Fillers, Hot-Applied, for Joints and Cracks in Asphaltic and Portland Cement Concrete Pavements
- W. COE CRD-C 513 (1974) Specifications for Rubber Waterstops
- X. COE CRD-C 572 (1974) Specifications for Polyvinylchloride Waterstops

#### **1.04 DESIGN REQUIREMENTS**

Formwork shall be designed in accordance with methodology of ACI 347 for anticipated loads, lateral pressures, and stresses. Forms shall be capable of producing a surface, which meets the requirements of the class of finish specified in Section 03 30 00 CAST-IN-PLACE CONCRETE. Forms shall be capable of withstanding the pressures resulting from placement and vibration of concrete.

#### **1.05 SUBMITTALS**

- A. See Section 01 30 00 – Administrative Requirements
- B. Formwork - Drawings showing details of formwork, including dimensions of panel joints, supports, studding and shoring, and sequence of form and shoring removal. Manufacturer's recommendation on method and rate of application of form release agents.
- C. Samples of form ties and method of sealing form tie hole from transmission of water in hydraulic structures.
- D. Construction and Control Joints: Layout and location for each type.
- E. Manufacturer's literature, including safety data sheets, for preformed fillers and the lubricants used in their installation; field-molded sealants and primers (when required by sealant manufacturer); preformed compression seals and preformed control joints.
- F. Water Stops - Details of splices, method of securing and supporting water stop in forms to maintain proper orientation and location during concrete placement.
- G. Samples of all proposed waterstops this includes both PVC and hydrophilic waterstops.

## **1.06 QUALITY ASSURANCE**

Design formwork under direct supervision of a Professional Structural Engineer experienced in design of concrete formwork and licensed in the State of South Carolina.

## **1.07 DELIVERY, STORAGE AND HANDLING**

Material delivered and placed in storage shall be stored off the ground and protected from moisture, dirt, and other contaminants. Sealants shall be delivered in the manufacturer's original unopened containers. Sealants whose shelf life has expired shall be removed from the site.

## **PART 2 PRODUCTS**

### **2.01 WOOD FORM MATERIALS**

- A. Form Materials: At the discretion of the Contractor.
- B. Softwood Plywood: PS 1, C Grade, Group 2.
- C. Softwood Plywood: PS 1, B-B High Density Concrete Form Overlay, Class I.
- D. Plywood: Douglas Fir species; solid one side grade; sound undamaged sheets with clean, true edges.
- E. Lumber: Straight, dressed on all sides, uniform width and thickness, free from knots, offsets, holes, dents, and other surface defects; with grade stamp clearly visible.

### **2.02 PREFABRICATED FORMS**

- A. Manufacturers:
  - 1. Alabama Metal Industries Corporation; [www.amico-online.com](http://www.amico-online.com).
  - 2. Molded Fiber Glass Concrete Forms Co.
  - 3. Reward Wall Systems.
  - 4. SureVoid Products, Inc.
  - 5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Preformed Steel Forms: Minimum 16 gage matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
- C. Preformed Plastic Forms: Thermoplastic polystyrene form liner, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
- D. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.
- E. Tubular Column Type: Round, spirally wound laminated fiber material, surface treated with release agent, non-reusable, of sizes indicated.

## 2.03 FORMWORK ACCESSORIES

- A. Form Ties: Removable type, galvanized metal, fixed length, cone type, with waterproofing washer, 7/8 inch back break dimension, free of defects that could leave holes larger than 1 inch in concrete surface.
- B. Water Stop Ties: For water-holding structures, basements, pipe galleries, and accessible spaces below finish grade, furnish 6-inch high polyvinylchloride waterstops. Polyvinylchloride waterstops for expansion joints shall be centerbulb type equal to No. 7C by W.R. Grace and Company, No. 9380LB by Sonneborn-Contech, RCB-6316 by BoMetals, Inc. or equal. Polyvinylchloride waterstops for construction joints shall be No. 3 by W.R. Grace and Company, No. 4316 by Sonneborn-Contech, FR-6316 by BoMetals, Inc., or equal, and as specified herein. Polyvinylchloride waterstops have the following properties:
- |   |                  |
|---|------------------|
| Tensile Strength (ASTM D412)            | 2000 psi min.    |
| Ultimate Elongation (ASTM D412)         | 350 Percent min. |
| Low Temperature Brittleness (ASTM D746) | (-)35 Degrees F. |
- Orient water stop perpendicular to tie and symmetrical about center of tie. Design ties to prevent rotation or disturbance of center portion of tie during removal of ends and to prevent water leaking along tie.
- C. Form Release Agent: Material: Release agent shall not bond with, stain, or adversely affect concrete surfaces, and shall not impair subsequent treatment of concrete surfaces when applied to forms. A ready-to-use water based material formulated to reduce or eliminate surface imperfections, containing no mineral oil or organic solvents. Environmentally safe, meeting local, state, and federal regulation and can be used in potable water facilities.
- D. Corners: Filleted, rigid plastic type; 1 x 1 inch size; maximum possible lengths.
- E. Dovetail Anchor Slot: Stainless steel, 22 gage thick, foam filled, release tape sealed slots, anchors for securing to concrete formwork.
- F. Flashing Reglets: Stainless steel, 22 gage thick, longest possible lengths, with alignment splines for joints, foam filled, release tape sealed slots, anchors for securing to concrete formwork.
- G. Nails, Spikes, Lag Bolts, Through Bolts, and Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

## 2.04 CONTRACTION JOINT STRIPS

Contraction joint strips shall be, rigid polyvinylchloride (PVC) or high impact polystyrene (HIPS) insert strips specifically designed to induce controlled cracking in slabs on grade may be used. Such insert strips shall have removable top section.

## 2.05 PREFORMED EXPANSION JOINT FILLER

Expansion joint filler shall be pre-formed material conforming to ASTM D 1751 or ASTM D 1752. Unless otherwise indicated, filler material shall be 10 mm 3/8 inch thick and of a width applicable for the joint formed. Backer material, when required, shall conform to ASTM D 5249.

## 2.06 SEALANT

- A. Preformed Polychloroprene Elastomeric Type ASTM D 2628.
- B. Two Component Polyurethane, Field-Molded Type ASTM C 920, Type M, Grade P or NS, Class 25, Use T for horizontal joints. Type M, Grade NS, Class 25, Use NT for vertical joints. Bond breaker material shall be polyethylene tape, coated paper, metal foil or similar type materials. The back-up material shall be compressible, non-shrink, nonreactive with



sealant and non-absorptive material type such as extruded butyl or polychloroprene rubber.

## 2.07 PVC WATERSTOPS FOR EXPANSION JOINTS

- A. Provide flexible PVC (polyvinyl chloride) waterstop as manufactured by Greenstreak, profile style number 732, FR-6316 by BoMetals or approved equal. This profile has a length of 6 inches, a thickness of 3/8 inch a bulb diameter of 7/8 inch, and rib dimension of 5/8 inch.
- B. The PVC waterstop shall be extruded from an elastomeric plastic material of which the basic resin is prime virgin polyvinyl chloride. The PVC compound shall not contain any scrapped or reclaimed material or pigment whatsoever.
- C. Performance Requirements as follows:

Property	Test Method	Required Limits
Water absorption	ASTM D 570	0.15% max
Tear Resistance	ASTM D 624	200 lb/in (35 kN/m) min.
Ultimate Elongation	ASTM D 638	350% min.
Tensile Strength	ASTM D 638	2000 psi (13.78 Mpa) min.
Low Temperature Brittleness	ASTM D 746	No Failure @ -35° F (-37° C)
Stiffness in Flexure	ASTM D 747	600 psi (4.13 Mpa) min.
Specific Gravity	ASTM D 792	1.45 max.
Hardness, Shore A	ASTM D 2240	79 +3
Tensile Strength after accelerated extraction	CRD-C 572	1850 psi (11.03 Mpa) min.
Elongation after accelerated extraction	CRD-C 572	300% min.
Effect of Alkalies after 7 days: Weight Change Hardness Change	CRD-C 572	between -0.10% / +0.25% +/- 5 points

## 2.08 HYDROPHILIC WATERSTOP FOR NON-MOVING CONTRACTION AND CONSTRUCTION JOINTS

- A. Provide hydrophilic rubber waterstop as supplied by Greenstreak, HYDROTITE profile style number CJ-1020-2K or approved equal. This profile has a width of 0.79 inches and a height of 0.39 inches.
- B. The waterstop shall be a combination of chloroprene rubber and chloroprene rubber modified to impart hydrophilic properties.
- C. The waterstop shall have a delay coating to inhibit initial expansion due to moisture present in fresh concrete.
- D. Performance Requirements as follows:

### Chloroprene Rubber

Property	Test Method	Required Limits
Tensile Strength	ASTM D 412	1300 PSI min.
Ultimate Elongation	ASTM D 412	400% min.
Hardness (Shore A)	ASTM D 2240	50 +/- 5
Tear Resistance	ASTM D 624	100 lb/inch min.

### Modified Chloroprene (Hydrophilic) Rubber

Property	Test Method	Required Limits
Tensile Strength	ASTM D 412	350 PSI min.
Ultimate Elongation	ASTM D 412	600% min.
Hardness (Shore A)	ASTM D 2240	52 +/- 5
Tear Resistance	ASTM D 624	50 lb/inch
Expansion Ratio	Volumetric Change - Distilled Water at 70° F	3 to 1 min.

## 2.09 WATERSTOP ACCESSORIES

### A. PVC Waterstops

1. Provide factory made waterstop fabrications for all changes of direction, intersections, and transitions leaving only straight butt joint splices for the field.
2. Provide hog rings or grommets spaced at 12 inches on center along length of waterstop.
3. Provide Teflon-coated thermostatically controlled waterstop splicing irons for field butt splices.

### B. Hydrophilic Waterstops

1. Provide Greenstreak 7300 two-component epoxy gel or engineer approved equal to secure HYDROTITE to rough, wet (or dry) concrete.
2. Provide LEAKMASTER single-component hydrophilic sealant or engineer approved equal to secure HYDROTITE to rough, dry concrete.
3. Provide cyanacrylate adhesive (super glue) for all splices.

## PART 3 EXECUTION

### 3.01 ERECTION - FORMWORK

- A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.
- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
- C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- D. Align joints and make watertight. Keep form joints to a minimum.
- E. Obtain approval before framing openings in structural members that are not indicated on drawings.
- F. Provide fillet strips on external corners of beams, joists, columns, and walls. Fillet strips shall be placed in the forms.
- G. Install void forms in accordance with manufacturer's recommendations. Protect forms from moisture or crushing.

- H. Coordinate this section with other sections of work that require attachment of components to formwork.
- I. If formwork is placed after reinforcement, resulting in insufficient concrete cover over reinforcement, request instructions from the Engineer before proceeding.

### **3.02 APPLICATION - FORM RELEASE AGENT**

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

### **3.03 INSERTS, EMBEDDED PARTS AND OPENINGS**

- A. Provide formed openings where required for items to be embedded in passing through concrete work.
- B. Locate and set in place items that will be cast directly into concrete.
- C. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.
- D. Position recessed anchor slots for brick veneer masonry anchors to spacing and intervals.
- E. Install accessories in accordance with manufacturer's instructions so they are straight, level and plumb. Ensure items are not disturbed during concrete placement.
- F. Install waterstops in accordance with manufacturer's instructions, so they are continuous without displacing reinforcement. Heat seal joints so they are watertight.
- G. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- H. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

### **3.04 FORM CLEANING**

- A. Clean forms as erection proceeds, to remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.
  - 1. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
  - 2. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

### **3.05 FORMWORK TOLERANCES**

- A. Construct formwork to maintain tolerances required by ACI 301.
- B. Construct and align formwork for elevator hoistway in accordance with ASME A17.1.
- C. Camber slabs and beams 1/4 inch per 10 feet.
- D. Camber slabs and beams in accordance with ACI 301.

### **3.06 FIELD AND QUALITY CONTROL**

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 45 29.
- B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and to verify that supports, fastenings, wedges, ties, and items are secure.
- C. Do not reuse wood formwork more than three (3) times for concrete surfaces to be exposed to view. Do not patch formwork.

### **3.07 FORM REMOVAL**

Forms shall be removed preventing injury to the concrete and ensuring the complete safety of the structure. Formwork for columns, walls, side of beams and other parts not supporting the weight of concrete may be removed when the concrete has attained sufficient strength to resist damage from the removal operation but not before at least 24 hours has elapsed since concrete placement. Supporting forms and shores shall not be removed from beams, floors and walls until the structural units are strong enough to carry their own weight and any other construction or natural loads. Supporting forms or shores shall not be removed before the concrete strength has reached 70 percent of design strength, as determined by field cured cylinders or other approved methods. Job-cured test specimens shall demonstrate this strength, and by a structural analysis considering the proposed loads in relation to these test strengths and the strength of forming and shoring system. The job-cured test specimens for form removal purposes shall be provided in numbers as directed and shall be in addition to those required for concrete quality control. The specimens shall be removed from molds at the age of 24 hours and shall receive, insofar as possible, the same curing and protection as the structures they represent.

### **3.08 CONTRACTION JOINTS**

Contraction joints may be constructed by inserting tempered hardboard strips or rigid PVC or HIPS insert strips into the plastic concrete using a steel parting bar, when necessary, or by cutting the concrete with a saw after concrete has set. Joints shall be approximately 1/8 inch wide and shall extend into the slab one-fourth the slab thickness, minimum, but not less than 1 inch.

### **3.09 JOINT STRIPS**

Strips shall be of the required dimensions and as long as practicable. After the first floating, the concrete shall be grooved with a tool at the joint locations. The strips shall be inserted in the groove and depressed until the top edge of the vertical surface is flush with the surface of the slab. The slab shall be floated and finished as specified. Working of the concrete adjacent to the joint shall be the minimum necessary to fill voids and consolidate the concrete. Where indicated, the top portion of the strip shall be sawed out after the curing period to form a recess for sealer. The removable section of PVC or HIPS strips shall be discarded and the insert left in place. True alignment of the strips shall be maintained during insertion.

### **3.10 SAWED JOINTS**

Joint sawing shall be early enough to prevent uncontrolled cracking in the slab, but late enough that this can be accomplished without appreciable spalling. Concrete sawing machines shall be adequate in number and power, and with sufficient replacement blades to complete the sawing at the required rate. Joints shall be cut to true alignment and shall be cut in sequence of concrete placement. Sludge and cutting debris shall be removed.

### **3.11 EXPANSION JOINTS**

Preformed expansion joint filler shall be used in expansion and isolation joints in slabs around columns and between slabs on grade and vertical surfaces where indicated. The filler shall extend the full slab depth, unless otherwise indicated. The edges of the joint shall be neatly finished with an edging tool of 1/8 inch radius, except where a resilient floor surface will be applied. Where the joint is to receive a sealant, the filler strips shall be installed at the proper level below the finished floor with a slightly tapered, dressed and oiled wood strip temporarily secured to the top to form a recess to the size shown on the drawings. The wood strip shall be removed after the concrete has set. Contractor may opt to use a removable expansion filler cap designed and fabricated for this purpose in lieu of the wood strip. The groove shall be thoroughly cleaned of laitance, curing compound, foreign materials, protrusions of hardened concrete, and any dust, which shall be blown out of the groove with oil-free compressed air.

### **3.12 JOINT SEALANT**

Sawed contraction joints and expansion joints in slabs shall be filled with joint sealant, unless otherwise shown. Joint surfaces shall be clean, dry, and free of oil or other foreign material, which would adversely affect the bond between sealant and concrete. Joint sealant shall be applied as recommended by the manufacturer of the sealant.

### **3.13 JOINTS WITH FIELD-MOLDED SEALANT**

Joints shall not be sealed when the sealant material, ambient air, or concrete temperature is less than 4 degrees C 40 degrees F. When the sealants are meant to reduce the sound transmission characteristics of interior walls, ceilings, and floors the guidance provided in ASTM C 919 shall be followed. Joints requiring a bond breaker shall be coated with curing compound or with bituminous paint. Bond breaker and back-up material shall be installed where required. Joints shall be primed and filled flush with joint sealant in accordance with the manufacturer's Recommendations.

### **3.14 WATERSTOP INSTALLATION**

#### **A. PVC Waterstop**

1. Field butt splices shall be heat fused welded using a Teflon covered thermostatically controlled waterstop splicing iron at approximately 380 degrees F. Follow approved manufacturer recommendations.
2. Lapping of waterstop, use of adhesives, or solvents shall not be allowed.
3. Center waterstop in joint and secure waterstop in correct position using hog rings or grommets spaced at 12" on centers along the length of the waterstop and wire tie to adjacent reinforcing steel.

#### **B. Hydrophilic Waterstop**

1. Cut coil ends square (or at proper angle for mitered corners) with shears or sharp blade to fit splices together without overlaps.
2. Splices shall be sealed using cyanoacrylate adhesive (super glue) and LEAKMASTER.

3. Seal watertight any exposed cells of HYDROTITE using LEAKMASTER.
4. Follow approved manufacturer recommendations.

C. Hydrophilic and PVC Intersections

1. Maintain continuity of waterstops at all intersections and transitions.
2. Joinery between PVC and HYDROTITE shall be sealed using LEAKMASTER.
3. Follow approved manufacturer recommendations.

**END OF SECTION**

**SECTION 03 20 00**  
**CONCRETE REINFORCING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Reinforcing steel for cast-in-place concrete.
- B. Supports and accessories for steel reinforcement.

**1.02 RELATED SECTIONS**

- A. Section 03 10 00 - Concrete Forming and Accessories.
- B. Section 03 30 00 - Cast-In-Place Concrete.

**1.03 REFERENCES**

- A. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International; 2010.
- B. ACI 318 - Building Code Requirements for Reinforced Concrete and Commentary; American Concrete Institute International; 2011.
- C. ACI 350R – Environmental Engineering Concrete Structures; American Concrete Institute International, 2004.
- D. ACI SP-66 - ACI Detailing Manual; American Concrete Institute International; 2004.
- E. ASTM A 82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement; 1997a.
- F. ASTM A 184/A 184M - Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement; 1996.
- G. ASTM A 185 - Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement; 1997.
- H. ASTM A 497 - Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement; 1997.
- I. ASTM A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement; 1996a.
- J. ASTM A 706/A 706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement; 1998.
- K. ASTM A 775/A 775M - Standard Specification for Epoxy-Coated Reinforcing Steel Bars;
- S. CRSI (DA4) - Manual of Standard Practice; Concrete Reinforcing Steel Institute; Latest Edition.
- T. CRSI (P1) - Placing Reinforcing Bars; Concrete Reinforcing Steel Institute; Latest Edition

## **1.04 SUBMITTALS**

- A. See Section 01 30 00 – Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Comply with requirements of ACI SP-66. Include bar schedules, shapes of bent bars, spacing of bars, and location of splices.
  - 1. Prepare shop drawings under seal of a Professional Structural Engineer experienced in design of work of this type and licensed in the State of South Carolina.
- C. Manufacturer's Certificate: Certify that reinforcing steel and accessories supplied for this project meet or exceed specified requirements.
- D. Reports: Submit certified copies of mill test report of reinforcement materials analysis.
- E. Mechanical reinforcing bar splice manufacturer's information

## **1.05 QUALITY ASSURANCE**

- A. Perform work of this section in accordance with ACI 301.
  - 1. Maintain one copy of each document on project site.
- B. Provide with access to fabrication plant to facilitate inspection of reinforcement. Provide notification of commencement and duration of shop fabrication in sufficient time to allow inspection.
- C. Welders' Certificates: Submit certifications for welders employed on the project, verifying AWS qualification within the previous 12 months.

## **1.06 DELIVERY AND STORAGE**

Reinforcement and accessories shall be stored off the ground on platforms, skids, or other supports. Reinforcement shall be kept covered to minimize rust and scale buildup until ready for placement.

## **PART 2 PRODUCTS**

### **2.01 REINFORCEMENTS**

- A. Reinforcing Steel: ASTM A 615/A 615M Grade 60 (420).
  - 1. Plain billet-steel bars.
  - 2. Unfinished.
  - 3. Shop fabricated and bent cold.
- D. Welded Steel Wire Fabric: ASTM A 185.
  - 1. Flat Sheets.
  - 2. Mesh Size and Wire Gage: As indicated on drawings.
- E. Synthetic Fiber Reinforcement: Synthetic fiber shall be polypropylene with a denier less than 100 and a nominal fiber length of 50 mm 2 inches.



- F. Reinforcement Accessories:
  - 1. Tie Wire: Annealed, minimum 16 gage (1.5 mm).
  - 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
  - 3. Provide stainless steel components for placement within 1-1/2 inches (38 mm) of weathering surfaces.

## **2.02 DEVELOPMENT AND SPLICES**

- A. Conform to ACI 318, Chapter 12, and ACI 350R.
- B. Unless noted otherwise all splices shall be Class B tension laps for top bars or other bars as applicable. Refer for drawings for lap lengths.
- C. Welded wire fabric lap 9 inches, minimum.

## **2.03 FABRICATION**

- A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice.
- B. Welding of reinforcement is not permitted unless approved by the engineer. Perform welding in accordance with AWS D1.4.
- C. Locate reinforcing splices not indicated on drawings at point of minimum stress, if feasible.
  - 1. Review locations of splices with the Structural Engineer.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Placing
  - 1. General: Reinforcing steel shall be placed in accordance with the drawings and reviewed shop drawings and the applicable requirements of the "Codes and Standards" hereinbefore specified. Install reinforcement accurately and secure against movement, particularly under the weight of workmen and the placement of concrete.
  - 2. Reinforcing Supports: Bars shall be supported on metal chairs or spacers on metal hangers, accurately placed and securely fastened to hold reinforcement in place. Additional bars shall be supplied whether specifically indicated on the drawings or not where necessary to securely fasten reinforcement in place. Support legs of accessories in forms without embedding in form surface. Spacing of chairs and accessories shall conform to CRSI'S "Manual of Standard Practice." Hooping and stirrups shall be accurately spaced and wired to the reinforcing. No wood will be permitted inside forms. Where the concrete surface will be exposed to the weather in the finished structure, the portions of all accessories within 1/2 inch of the concrete surface shall be noncorrosive or protected against corrosion.
- C. Slab reinforcing supports: All slab reinforcement shall be supported on approved continuous slab bolsters. To prevent feet penetration into subgrade or formwork, slab bolsters shall have a continuous base. For slabs over insulation, slab bolsters shall have a continuous plate base. Spacing of bolsters shall not exceed 4'-0" on center.

- D. Placing and Tying: All reinforcing shall be set in place, spaced, and rigidly and securely tied or wired with 16 gauge steel tie wire at all splices and at sufficient points to hold the reinforcing in its proper position. Rebending of bars on the job to fit existing conditions will not be permitted without the written approval of the Engineer. Point ends of wire ties away from forms.
- E. Spacing: Minimum center to center distance between parallel bars shall be in accordance with the details on the drawings or, where not indicated, the clear spacing shall be 2 times the bar diameter but in no case less than 1-1/2 inches nor less than 1-1/3 times the maximum size aggregate.
- F. Splices:
1. Laps of splices, where indicated on the drawings, shall be adequate to transfer stress by bond.
  2. Unless indicated otherwise on the drawings, lap bars according to ACI 318, Class B. Lap bars in masonry in accord with ACI 530, with a minimum of 48 diameters.
  3. Wherever possible, splices of adjacent bars shall be staggered.
  4. All splices not indicated shall be subject to acceptance by the Engineer.
  5. Mechanical connections for reinforcing bars shall develop 125% of the yield strength of the spliced bars.
- G. Welded Wire Fabric: Wire fabric shall be in as long lengths as practicable and shall be wired at all laps and splices. End laps shall be off-set in adjacent widths. Welded wire fabric shall be supported with approved slab bolsters and as required for slab reinforcing supports.
- H. Dowel aligners: Dowel aligner shall be installed in accordance with manufacturer's recommendations.
- I. Dowels: Dowels shall be tied securely in place before concrete is deposited. In the event there are no bars in position to which dowels may be tied, a #3 bar minimum shall be added to provide proper support and anchorage. Bending of dowels after placement of concrete will not be permitted. Templates shall be furnished for all column and pier dowels.
- J. Protective Concrete Covering: Except where indicated otherwise on drawings, the minimum concrete coverage for steel reinforcement shall be as follows:
1. Concrete cast against and permanently exposed to earth: 3 inches.
  2. Formed concrete exposed to weather or earth: 1-1/2 inches for bars No. 5 and smaller, and 2 inches for bars over No. 5 in size.
  3. Concrete not exposed to weather or in contact with ground:
    - a. Slabs, walls, joists: 3/4 inches for bars No. 11 and smaller and 1-1/2 inches for bars over No. 11 in size.
    - b. Beams, columns: Primary reinforcement, ties, stirrups, spiral: 1-1/2 inches.
- K. Placing Tolerances: Bars shall be placed to the following tolerances:
1. Clear distance to formed surfaces:  $\pm 1/4$  inches.
  2. Minimum spacing between bars:  $\pm 1/4$  inch.

3. Top bars in slabs and beams:
  - a. Members 8 inches deep or less:  $\pm 1/4$  inch.
  - b. Members more than 8 inches but not over 2 feet deep:  $\pm 1/2$  inches.
  - c. Members more than 2 feet deep:  $\pm 1$  inch.
4. Crosswise of members: Spaced evenly within 2 inches.
5. Lengthwise of members.  $\pm 2$  inches.
- L. Bars may be moved as necessary to avoid interference with other reinforcing steel, conduits or embedded items. If bars are moved more than one bar diameter, or enough to exceed the above tolerances, the resulting arrangement of bars shall be subject to acceptance by the Engineer.
- M. Cleaning: Reinforcement, at time concrete is placed, shall be free of all coatings that would impair bond to concrete.

### **3.02 FIELD QUALITY CONTROL**

#### **A. Notification**

1. Subcontractor shall notify the Engineer, Building Department and Testing Laboratory at least 48 hours ahead of each concrete pour, and no concrete shall be placed until all reinforcing steel has been installed by the Subcontractor and approved by the Engineer or Testing Laboratory.

#### **B. Correction During Concreting**

1. Capable steel workmen shall be kept on the work at all times during the placing of concrete and shall properly reset any reinforcement displaced by runways, workmen, or other causes.

#### **C. Defective Work**

1. The following reinforcing steel work will be considered defective and may be ordered by the Engineer to be removed and replaced by the Subcontractor at no additional cost to the Builder or Owner.
  - a. Bars with kinks or bends not shown on Drawings.
  - b. Bars injured due to bending or straightening.
  - c. Bars heated for bending.
  - d. Reinforcement not placed in accordance with the Drawings and/or Specifications.

**END OF SECTION**

## SECTION 03 30 00

### CAST IN PLACE CONCRETE

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Concrete formwork.
- B. Elevated concrete slabs.
- C. Floors and slabs on grade.
- D. Concrete shear walls, elevator shaft walls, and foundation walls.
- E. Concrete foundations for water storage tank(s).
- F. Concrete reinforcement.
- G. Joint devices associated with concrete work.
- H. Miscellaneous concrete elements, including equipment pads, light pole bases, flagpole bases, thrust blocks, and manholes.
- I. Concrete curing.
- J. Provide cast-in-place concrete, including formwork and reinforcement, where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.

##### 1.02 RELATED SECTIONS

- A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, and Sections in Division 01 of these Specifications.

##### 1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements.
- C. Samples: Submit samples of under slab vapor retarder to be used.
- D. Samples: Submit two, 12-inch long samples of waterstops and construction joint devices.
- E. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent construction for concrete accessories.
- F. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.
- G. Within fifteen (15) calendar days after receiving the Owner's Notice to Proceed, submit proposed mix designs for approval.

1. Proportions shall be determined by means of laboratory tests of concrete made with the cement and aggregate proposed for use.
2. Provide report in detail from an approved testing laboratory showing 7-day and 28-day strengths obtained using materials proposed.
3. Required average strength above specified strength:
  - a. Determinations of required average strength above specified strength ( $f_c$ ) shall be in accordance with ACI 318 and ACI 301.
  - b. Establish the required average strength of the design mix using the materials proposed to be employed. Standard deviations shall be determined by thirty tests. Average strength used for selecting proportions shall exceed specified strength ( $f_c$ ) by at least:
    - 1) 400 psi Standard deviation is less than 300
    - 2) 550 psi Standard deviation is 300 to 400
    - 3) 700 psi Standard deviation is 400 to 500
    - 4) 900 psi Standard deviation is 500 to 600
    - 5) 1,200 psi Standard deviation is above 600 or unknown
  - c. When the ready-mix producer does not have a record of past performance, the combination of materials and the proportions selected shall be selected from trial mixes having proportions and consistencies suitable for the work using at least three (3) different water/cement ratios which will produce a range of strengths encompassing those required. Average strength required shall be 1,200 psi above specified strength.
4. Cost of this work shall be borne by the Contractor.
  - A. Manufacturer's data: Submit manufacturer's specification with application instructions for proprietary materials and items, including curing compound, form release agents, admixtures, patching compounds, and others as required by the Engineer.
  - B. Shop drawings: Submit the following shop drawings to the Engineer for approval before work is started:
    1. Reinforcing steel drawings: Prepare in accordance with ACI 315. Indicate bending diagrams, assembly diagrams, splicing and laps of bars, dimensions and details of bar reinforcing and accessories.
    2. Cementitious coating.

#### **1.04 QUALITY ASSURANCE**

- A. Perform work of this section in accordance with ACI 301 and ACI 318.
  1. Maintain one copy of each document on site.
- B. Acquire cement from same source and aggregate from same source for entire project.
- C. Follow recommendations of ACI 305R when concreting during hot weather.
- D. Follow recommendations of ACI 306R when concreting during cold weather.

- E. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- F. Testing agency: A testing laboratory will be retained by the Owner to perform material evaluation tests required by these Specifications.
- G. Qualifications of contractors performing concrete work: Minimum of two (2) years' experience on comparable concrete projects.
- H. Plant qualification: Plant equipment and facilities shall meet all requirements of the Check List for Certification of Ready Mixed Concrete Production Facilities of the National Ready Mixed Concrete Association and ASTM C94.

## **1.05 PRODUCT HANDLING**

- A. Comply with pertinent provisions of Section 01 60 00.
- B. Store reinforcement in a manner that will avoid excessive rusting or coating by grease, oil, dirt and other objectionable materials.
- C. Keep reinforcement in separate piles or racks so as to avoid loss of identification after bundles are broken.

## **PART 2 PRODUCTS**

### **2.01 FORMWORK**

- A. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
  - 1. Form Facing for Exposed Finish Concrete: Contractor's choice of materials that will provide smooth, stain-free final appearance.
- B. Use form materials conforming to ACI 347.
- C. Form lumber: Use lumber of sufficient quality and grade, size and stiffness to adequately support the work and ensure dimensional accuracy.
- D. Form ties: Use form ties which do not leave an open hole through the concrete and which permit neat and solid patching at every hole.
  - 1. Use ties with cones that allow a 1" break back and facilitate patching.
  - 2. On structures containing water or other liquid or below grade structures, use embedded rod ties with integral waterstops in addition to cones.
  - 3. Wire ties and wood spreaders will not be permitted.
- E. Form coatings: Form release coating shall be neat oil with surface wetting agent or chemical release agent which effectively prevents absorption of moisture, prevents bonding with concrete, is non-staining to concrete and leaves the concrete with a paintable surface.

1. On surfaces to receive an applied coating, use a residual free chemical form release agent which is compatible with the applied coating and will not prevent the applied finish from satisfactorily bonding to the concrete.
2. Chamfer strips: Chamfer strips shall be wood or polyvinyl strips or approved equal, designed to be nailed in the forms to provide a 3/4" chamfer (unless indicated otherwise) at all exposed edges and corners of concrete members.

## 2.02 REINFORCEMENT

A. Comply with the following as minimums:

1. Bars: ASTM A615, Grade 60, unless otherwise shown on the Drawings, using deformed bars for Number 3 and larger.
  - a. Welded wire fabric: ASTM A185.
    - 1) Use sheet (mat) welded wire fabric only.
    - 2) Welded wire fabric supplied in rolls will not be accepted.
  - b. Bending: ACI 315 and ACI 318.
2. Fabricate reinforcement to the required shapes and dimensions, within fabrication tolerances stated in the CR "Manual of Standard Practices".
3. Do not use reinforcement having any of the following defects:
  - a. Bar lengths, depths, or bends exceeding the specified fabricating tolerances.
  - b. Bends or kinks not indicated on the Drawings or required for this Work.
  - c. Bars with excessive rust, scale, dirt, oil or other defects which will reduce the bond or the effective cross section of the bar.
4. Furnish all support bars, tie bars, chairs, bolsters, etc. required for properly supporting and spacing bars in the forms.
  - a. For slabs on grade, use supports with stand plates or horizontal runners where wetted base materials will not support chair legs. Other supports must be approved by the Engineer.
  - b. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are hot-dip galvanized, plastic protected or stainless steel.
  - c. Supply supports for welded wire fabric as follows:

<u>Welded Wire (Diameter)</u>	<u>Welded Wire Spacing (inches)</u>	<u>Max. Support Spacing (feet)</u>
W9 or Larger	12 and Greater	4
W5 to W8	12 and Greater	3
W9 and Larger	Less than 12	3
W4 to W8	Less than 12	2
Less than W4	Less than 12	1.5

5. Tie wire: FS QQ-W-461, annealed steel, black, 16 gauge minimum.
6. Welding electrodes: AWS A5.1, low hydrogen, E70 series.
7. Splice devices: Shall be sized to develop one hundred twenty-five (125%) percent of yield strength of bar.

### **2.03 CONCRETE MATERIALS**

- A. Cement: ASTM C 150, Type I - Normal, Type 1-P or Type II, Portland type low alkali.
  1. Where concrete will be exposed to sewage, use Type II or I-P cement.
  2. Fly ash shall conform to ASTM C618, Class C or F.
  3. Fly ash content shall not exceed 20% by weight of the total amount of cementitious materials (Portland cement plus fly ash).
- B. Fine and Coarse Aggregates: ASTM C 33, Coarse, use No. 57 aggregates.
- C. Lightweight Aggregate: ASTM C 330.
- D. Calcined Pozzolan: ASTM C 618, Class N.
- E. Silica Fume: ASTM C 1240, proportioned in accordance with ACI 211.1.
- F. Water: Clean and not detrimental to concrete.
- G. Fiber Reinforcement: 1/2 inch length.
  1. Use fiber reinforcing where indicated on the drawings.
  2. Provide polypropylene or co-polymer fibers as manufactured by High Tech Fibers, Inc., Fibermesh Company or an approved equal.
  3. Where required, use fiber reinforcing at a rate of 2.0 lbs. per cubic yard unless another rate is indicated on the drawings.

### **2.04 CHEMICAL ADMIXTURES**

- A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.
- B. Water reducing, set controlling admixture: Conform to ASTM C494.
  1. Type A - water reducing.
  2. Type D - water reducing and retarding.
- C. Superplasticizers: Conform to ASTM C494, Types F and G.
  1. Use superplasticizers in thin section placements and in areas of congested reinforcing and/or embedded items, or where otherwise approved by the Engineer.



2. Use where conventional consolidation techniques are impractical.
- D. Do not use admixtures containing calcium chloride.

## **2.05 ACCESSORY MATERIALS**

- A. Under slab Vapor Retarder: Multi-layer, fabric-, cord-, grid-, or aluminum-reinforced polyethylene or equivalent, complying with ASTM E 1745, Class A; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs. Single ply polyethylene is prohibited.
- B. Curing compounds:
1. On all vertical and formed surfaces, construction joints, basin slabs, surfaces to receive an applied coating or finish, and other surfaces except as otherwise indicated or specified, use a non-residual, non-staining curing compound conforming to ASTM C309 Type 1 and 1D. Acceptable products are:
    - a. L&M Cure W by L&M Construction Chemicals, Inc. (Interior Application). For exterior use L&M Cure W-2.
    - b. Clear Gaured Core & seal, Clear Seal Standard by A.C. Horn Company, Butterfield Color.
    - c. Kure 200W by Sonneborn, Inc.
    - d. Engineer Approved equal.
  2. On building floor slabs not otherwise receiving an applied coating or finish and on other flatwork as indicated on the Drawings, provide an acrylic copolymer curing and sealing compound conforming to ASTM C309 Type 1 and the following:
    - a. Non-yellowing.
    - b. Minimum 20% solids.
    - c. Maximum unit moisture loss in accordance with ASTM C156 - 0.40 kg./sq.m at 72 hours.
    - d. Acceptable products are Dress & Seal by L&M Construction Chemicals, Inc., Clear Seal Standard by A.C. Horn Company, Kure-N-Seal by Sonneborn, Inc., or Engineer approved equal.

## **2.06 CONCRETE MIX DESIGN**

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
- B. Proportioning Structural Lightweight Concrete: Comply with ACI 211.2 recommendations.
- C. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.
1. For trial mixtures method, employ independent testing agency acceptable to Engineer for preparing and reporting proposed mix designs.

- D. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.
- E. Fiber Reinforcement: Add to mix at rate of 1.5 pounds per cubic yard (0.89 kg per cubic meter), or as recommended by manufacturer for specific project conditions.
- F. Provide concrete with the compressive strengths shown on the Drawings. When such strengths are not shown on the Drawings, provide the following 28-day strengths as minimum:
  - 1. All structural concrete except as indicated in Nos. 2 and 3 below 4,000 psi or as noted otherwise on the plans.
  - 2. All sidewalks, curbs and gutters, and unreinforced foundations 3,000 psi.
  - 3. Thrust blocking, backfill or encasement for piping, and concrete fill 2,500 psi.
  - 4. Prestressed or precast concrete, 5,000 psi.
- G. Maximum water cement ratios:
  - 1. 4000 psi concrete 0.5
  - 2. 3000 psi concrete 0.53
  - 3. 2500 psi concrete 0.67
- H. Entrained air:
  - 1. 3000 and 4000 psi concrete 5% (Maximum 1% Difference)
  - 2. 2500 psi concrete Not Required
- I. Slump:
  - 1. 3000 and 4000 psi concrete 4" (Maximum 1" Difference)
  - 2. 2500 psi concrete 5" (Maximum 1" Difference)

## 2.07 MIXING

- A. On Project Site: Mix in drum type batch mixer, complying with ASTM C 685. Mix each batch not less than 1-1/2 minutes and not more than 5 minutes.
- B. Transit Mixers: Comply with ASTM C 94/C 94M.

## 2.08 PRODUCTION OF CONCRETE

- A. General: Concrete shall be ready mixed and shall be batched, mixed and transported in accordance with ASTM C94 except as otherwise indicated.
- B. Monitor time and mix proportions by plant delivery slips.
- C. Air entraining admixtures: Add air entraining admixture into the mixture as a solution and measure by means of an approved mechanical dispensing device.

- D. Water reducing and retarding admixture: Add water reducing and retarding admixture and measure as recommended by the manufacturer.
- E. Addition of water to the mix upon arrival at the job site shall not exceed that necessary to compensate for a 1" loss in slump, nor shall the design maximum water-cement ratio be exceeded. Water shall not be added to the batch at any later time.
- F. Weather conditions: Control temperature of mix as required by ACI 306 "Cold Weather Concreting" and by ACI 305 "Hot Weather Concreting".

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify lines, levels, and dimensions before proceeding with work of this section.

### **3.02 PREPARATION**

- A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.
- B. Verify that forms are clean and free of rust before applying release agent.
- C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.
- D. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.
- E. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.
- F. Install vapor retarder under interior slabs on grade. Lap joints minimum 6 inches (150 mm) and seal watertight by taping edges and ends. Cover with sand to depth shown on drawings; repair damaged vapor retarder before covering.

### **3.03 SURFACE CONDITIONS**

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Water, mud, organic, and other detrimental material shall be removed from excavations before concrete is deposited.
- C. Notify the Engineer prior to placing concrete and place no concrete until the formwork, reinforcing and embedded items have been observed by the Engineer.

### **3.04 FORMWORK**

- A. General:
  - 1. Construct forms in conformance with ACI 347.

2. Design, erect, support, brace and maintain formwork so it will safely support vertical and lateral loads which might be applied until such loads can be supported safely by the concrete structure.
  3. Construct forms to the exact sizes, shapes, lines and dimensions shown, and as required to obtain accurate alignment, location, grades, level and plumb work in the finished structure.
  4. Provide formwork sufficiently tight to prevent leakage of cement paste during concrete placement. Solidly butt joints and provide backup material at joints as required to prevent leakage and prevent fins.
- B. Form construction and erection:
1. Construct forms in conformance with ACI 347.
  2. Provide for openings, offsets, keyways, recesses, moldings, reglets, chamfers, blocking, screeds, bulkheads, anchorages, inserts and other embedded items as required.
  3. Hold inner and outer forms for vertical concrete together with combination steel ties and spreaders approved by the Engineer.
  4. Unless specifically stated otherwise, provide 3/4" chamfer at all exposed edges of concrete.
  5. Provide temporary openings in the formwork where necessary to facilitate cleaning and inspection of the formwork.
  6. Coat form contact surfaces with approved form coating compound prior to placing reinforcing steel.
  7. Do not allow excess form coating material to accumulate in the forms or to come in contact with reinforcing surfaces which will bond to fresh concrete.
  8. Side forms for footings may be omitted, and concrete may be placed directly against excavation only when requested by the Contractor and approved by the Engineer.
  9. Provide a positive means of adjustment of shores and struts and ensure that all settlement is taken up during concrete placing.
  10. Construct blockouts and formed openings of sufficient size and proper location to permit final alignment of items within it or passing through it.
    - a. Allow sufficient space for grouting, packing or sealing around any items penetrating the opening as may be required to ensure watertightness.
    - b. Provide openings with continuous keyways with waterstops where required, and provide a slight flare to facilitate grouting and the escape of entrapped air during grouting.
    - c. Provide only blockouts or openings that are shown on the drawings or otherwise approved by the Engineer.

- C. Formwork reuse: Reuse only forms that are in good condition and which maintain a uniform surface texture on expose concrete surfaces.
1. Apply a light sanding as necessary to obtain a uniform texture.
  2. Plug unused tie holes and penetrations flush with the form surface.
- D. Removal of forms:
1. Do not disturb or remove forms until the concrete has hardened sufficiently to permit form removal with complete safety. Do not remove shoring until the member has acquired sufficient strength to support its own weight, the load upon it, and the added load of construction.
  2. Do not remove forms before the following minimum times without prior approval from the Engineer:
 

a. Sides of footings or slabs on grade	24 hrs
b. Walls not supporting load	48 hrs
c. Vertical sides of beams	48 hrs
d. Columns not supporting load	48 hrs
e. Suspended slabs or beam bottoms (forms only)	10 days
  4. In determining the minimum stripping times, consider only the cumulative time during which the ambient temperature of the air surrounding the concrete is above 50°.
  5. Do not remove shoring for suspended slabs or beams until the concrete has reached 75% of the specified 28 day strength.
  6. When reshoring or backshoring is permitted or required, plan the operations in advance and submit procedures to the Engineer for approval.
    - a. Design and plan all reshoring operations to support all construction loading and in accordance with ACI 347.
  7. Exercise care in removing forms from finished concrete surfaces so that surfaces are not marred or gouged and that corners are true, sharp and unbroken.
  8. Do not permit steel spreaders, form ties, or other metal to project from or be visible on any concrete surface except where so shown on the drawings.
  9. Whenever the formwork is removed during the curing period, continue to cure the exposed concrete by one of the methods specified herein.

### 3.05 EMBEDDED ITEMS

- A. Embedded items: Set anchor bolts and other embedded items accurately and securely in position in the forms until the concrete is placed and set.
1. Use templates where practical for all anchor bolts.

2. Check locations of all anchor bolt and special castings prior to placing concrete and verify locations after concreting.
- B. Piping cast in concrete:
1. Install and secure sleeves, wall pipes and pipe penetrations before placing concrete.
  2. Do not weld or otherwise attach piping to reinforcing steel.
  3. Support piping to be encased in concrete securely and on firm foundation so as to prevent movement or settlement during concreting.
- C. Locate electrical conduit so that it will not impair the strength of the construction.
1. Do not use conduits running within (not passing through) a slab, wall or beam that are larger in outside diameter than 1/3 overall concrete thickness unless otherwise approved by the Engineer.
  2. Do not space conduits closer than three conduit diameters apart unless otherwise approved by the Engineer.

### **3.06 INSTALLING REINFORCEMENT**

- A. Fabricate and handle epoxy-coated reinforcing in accordance with ASTM D 3963/D 3963M.
- B. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.
- C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.
- D. General: Comply with the specified codes and standards and Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars" for details and methods of reinforcement placement and supports and as herein specified.
1. Clean reinforcement and remove loose dust and mill scale, earth, and other materials which reduce or destroy bond with concrete.
  2. Position and secure reinforcement against displacement by forms, construction, and the concrete placement operations.
  3. Use adequate number of ties to secure reinforcing.
  4. Do not weld or field bend reinforcing without prior approval by the Engineer.
- E. Placing reinforcing:
1. Provide and install all chairs, runners, bolsters, standees and other accessories in sufficient quantities to satisfactorily position the reinforcing and hold it in place during concrete placement.
  2. Support reinforcing for slabs on ground on chairs or bolsters with stand plates or a properly sized concrete cube.

- a. Use concrete bricks as supports only as approved by the Engineer.
  3. Secure and tie dowels in place prior to placing concrete. Do not press dowels into wet concrete.
- F. Concrete cover: Unless otherwise indicated on the drawings or specified herein, install reinforcing with clear concrete coverage in conformance with ACI 318.
1. All reinforcement, regardless of size, exposed to water or sewage shall have 2" cover.
  2. Place reinforcement a minimum of 2" clear of any openings or metal pipe or fittings.
- G. Splicing reinforcement: Splice reinforcement steel in accordance with the latest revisions of ACI 318 "Building Code Requirements for Reinforced Concrete" unless shown otherwise on the drawings.
1. All splices at wall corners or intersections and at wall and foundation intersections shall be Class B tension splices.
  2. All other splices of vertical or horizontal steel in walls shall be Class B tension splices as per ACI 318. Horizontal ring steel in circular, non-prestressed concrete tanks shall be Class B tension splices and the splices shall be staggered so that no more than 50% of the bars are spliced at any one location.
  3. All welded or mechanical splicing devices shall develop 125% of the yield strength of the bar.
  4. Column vertical bars shall lap 30 bar diameters with dowels at the base of the column unless otherwise noted. Dowels shall be the same size and quantity as column vertical bars unless otherwise noted.
  5. All splices not otherwise shown or specified shall be Class B tension lap splices.
- H. Tolerances: Place bars in the locations indicated within the tolerances conforming to the CRSI "Manual of Standard Practice".
- I. Welded wire mesh: Install welded wire fabric in as long of a length as practicable and lay flat before placing concrete.
1. Use only mat welded wire fabric. Do not use welded wire fabric from rolls.
  2. Support and tie mesh to prevent movement during concrete placement.
  3. Lap adjoining pieces at least one full mesh and lace splices with wire.
  4. Provide, at a minimum, supports for welded wire fabric according to the Table in Section 2.2.D.3. Confirm the adequacy of the support spacings listed therein for the anticipated construction loads. Increase the number of supports, if necessary, to assure that the final position of the welded wire fabric will conform to that shown on the drawings.
  5. Do not place welded wire fabric on the subbase surface and then hook or "pull up" the reinforcement during concrete placement.

6. Do not lay welded wire fabric on top of the freshly placed concrete and then "walk it" into place.

### **3.07 PLACING CONCRETE**

- A. Preparation:
  1. Remove foreign matter accumulated in the forms.
  2. Rigidly close openings left in the formwork.
  3. Wet wood forms sufficiently to tighten up cracks. Wet other material sufficiently to maintain workability of the concrete.
  4. Use only clean tools.
  5. Provide and maintain sufficient tools and equipment on hand to facilitate uninterrupted placement of the concrete.
  6. Before commencing concrete, inspect and complete installation of formwork, reinforcing steel and all items to be embedded or cast-in.
- B. Place concrete in accordance with ACI 304R.
- C. Notify Engineer not less than 24 hours prior to commencement of placement operations.
- D. Install joint devices in accordance with manufacturer's instructions.
- E. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- F. Place concrete continuously between predetermined expansion, control, and construction joints.
- G. Do not interrupt successive placement; do not permit cold joints to occur.
- H. Saw cut joints within 24 hours after placing. Use 3/16 inch thick blade, cut into 1/4 depth of slab thickness.
- I. Conveying:
  1. Transport and handle concrete from the truck to the place of final deposit as rapidly as practicable by methods which will prevent segregation or loss of ingredients to maintain the quality of the concrete.
  2. Provide equipment for lifting, dumping, chuting, pumping or conveying the concrete, of such size and design as to ensure a practically continuous flow of concrete at the delivery and without separation of materials.
  3. Use hoppers and elephant trunks where necessary to prevent the free fall of concrete for more than 4'.
  4. Do not use concrete that is not placed within 1-1/2 hours after water is first introduced into the mix unless the slump is such that it meets the specified limits without the addition of water to the batch.



- J. Placing:
1. Deposit concrete as nearly as practicable in its final location so as to avoid separation due to rehandling and flowing.
  2. Deposit concrete in horizontal layers not deeper than 2', avoiding inclined layers.
  3. Place concrete at such a manner that concrete upon which fresh concrete is deposited is still plastic.
  4. Bring slab surfaces to the correct level with screeds set to the proper elevation.
- K. Hot weather placement: Place concrete in hot weather in accordance with ACI 305 "Hot Weather Concreting" and as specified herein.
1. Do not place concrete whose temperature exceeds 100°F.
  2. Thoroughly wet forms and reinforcing prior to placement of concrete.
  3. Use additional set retarder as necessary to increase set time.
  4. Limit the size of the pour where it may reduce the likelihood of cold joints due to reduced set time.
  5. Shade the fresh concrete as soon as possible after placing.
  6. Start curing as soon as the concrete is sufficiently hard to permit without damage.
- L. Cold weather placement: Place concrete in cold weather in accordance with ACI 306 and as specified herein.
1. Except when authorized specifically by the Engineer, do not place concrete when the atmospheric temperature is below 40°F.
  2. When cold weather placement is approved by the Engineer, heat either the mixing water or aggregate or both so that the concrete temperature is between 65°F and 85°F.
  3. Protect the freshly placed concrete by adequate housing or covering and provide heat to maintain a temperature of not less than 50°F for not less than four days.
  4. Do not add salts, chemicals, or other materials to the concrete mix to lower the freezing point of the concrete.
- M. Consolidation:
1. Consolidate each layer of concrete immediately after placing, by use of internal concrete vibrators supplemented by hand spading, rodding, or tamping.
    - a. Use vibrators having a 2" head diameter and a minimum frequency of 8000 vibrations per second.
    - b. Provide sufficient number of vibrators to properly consolidate the concrete, keeping up with placement operations.

- c. Provide at least one spare vibrator on site.
2. Insert and withdraw vibrators at points approximately 18" apart.
3. Do not vibrate forms or reinforcement.
4. Do not use vibrators to transport concrete inside the forms.

### **3.08 FINISHING CONCRETE**

- A. Finish schedule: Unless otherwise indicated on the drawings, finish all concrete surfaces in accordance with the following schedule:
  1. Form finish: Formed surfaces not ordinarily exposed to view, including:
    - a. Interior walls of open tanks below a line one foot lower than the lowest normal water level.
    - b. The underside of slabs not exposed to view.
    - c. Walls below grade.
  2. Cementitious coating: All formed surfaces exposed to view including:
    - a. Interior walls of tanks above a line one foot lower than the lowest normal water level.
    - b. The underside of slabs, soffits, etc. exposed to view.
  3. Float finish: Slab surfaces not exposed to view or not receiving an applied thin finish, including:
    - a. Bottom slabs of tanks or structures containing water sewage or other liquid.
    - b. Foundations not exposed to view.
    - c. Roof slabs to be covered with insulation and/or built-up roofing.
  4. Trowel finish: Interior slab surfaces exposed to view or to receive an applied thin film coating or floor finish, including:
    - a. Interior, indoor slabs and floors of buildings.
    - b. Surfaces on which mechanical equipment moves.
    - c. Floors receiving vinyl tile, resilient flooring carpet, paint, etc.
  5. Broom finish: Exterior, outdoor slabs exposed to view including:
    - a. Outdoor floor slabs and walkways.
    - b. Other floors which may become wet or otherwise require a non-skid surface.

- c. Sidewalks and concrete pavements.
  - 6. Scratch finish: Surfaces which are to receive a thick topping or additional concrete cast against them including:
    - a. Surfaces receiving concrete equipment pads.
    - b. Floors receiving concrete topping.
    - c. Construction joints not otherwise keyed.
  - 7. Edge finish: Exposed edges of slabs not receiving chamfer including:
    - a. Sidewalk edges and joints.
    - b. Pavement edges and joints.
    - c. Other slab edges not chamfered.
- B. Finishing procedures:
- 1. Form finish:
    - a. Repair defective concrete.
    - b. Fill depressions deeper than 1/4".
    - c. Fill tie holes.
    - d. Remove fins exceeding 1/8" in height.
  - 2. Cementitious finish:
    - a. Patch all tie holes and defects and remove all fins.
    - b. Within one day of form removal, fill all bug holes, wet the surfaces and rub with carborundum brick until a uniform color and texture are produced; or
    - c. Dampen surfaces, brush apply a grout slurry consisting of 1 part Portland cement to 1-1/2 parts sand, and rub the surface vigorously with a stone. Remove all excess grout.
    - d. Provide a two coat cement base waterproofing, sealing finish of Thoroseal and Thoroseal Plaster Mix manufactured by Standard Dry Wall Products, Inc. or an approved equal.
      - 1) Patch all tie holes and defects and removal all fins, and clean surface of all dirt, laitance, grease, form treatments, curing compounds, etc.
      - 2) Key coat: Apply key coat of Thoroseal at a rate of two (2) lbs. per sq. yd. by fiber brush. Mix material using one part of Acryl 60 to three parts clean water. Should material start to drag during application, dampen surface with water. During hot weather periods, dampen surfaces with water prior to application of key

coat material. Key coat shall be allowed to cure for five (5) days before applying finish coat.

- 3) Apply a finish coat consisting of a four (4) to six (6) lbs. per sq. yd. application of Thoroseal Plaster Mix using steel trowel or spray gun. Color to be selected by the Owner. Mix dry material using one (1) part Acryl 60 to three (3) parts clean water. Firmly press the mix into all voids and level with a steel trowel. When surface is set so that it will not roll or lift, float it uniformly using a sponge float.
3. Float finish:
    - a. Begin floating when the water sheen has disappeared and when the surface has stiffened sufficiently to permit the operation.
    - b. Cut down all high spots and fill all low spots and float the slab to a uniform sandy texture.
  4. Trowel finish:
    - a. Float finish as specified herein.
    - b. Power trowel to a smooth surface free of defects.
    - c. After the surface has hardened sufficiently, hand trowel until a ringing sound is produced as the trowel is moved over the concrete surface.
  5. Broom finish:
    - a. Float finish as specified herein.
    - b. Provide a scored texture by drawing a broom across the surface.
  6. Scratch surface:
    - a. Screed the surface to the proper elevations.
    - b. Roughen with rakes or stiff brushes.
  7. Edge finish:
    - a. Tool slab edges and joints with a 1/4" radius edging tool.

### **3.09 CURING AND PROTECTION**

- A. Comply with requirements of ACI 308. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Formed Surfaces: Cure by moist curing with forms in place for full curing period.
- C. Surfaces Not in Contact with Forms:
  1. Start initial curing as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.

2. Begin final curing after initial curing but before surface is dry.
  - a. Moisture-retaining cover: Seal in place with waterproof tape or adhesive.
  - b. Curing compound: Apply in two coats at right angles, using application rate recommended by manufacturer.
- D. Protect the surface finish of newly placed concrete from damage by rainwater or construction traffic.
- E. Do not apply design loads to structures until the concrete has obtained the specified strength.
  1. Do not backfill against walls until they have reached the specified strength and all supporting or bracing walls, slabs, etc. have also reached the specified strength, unless otherwise permitted by the Engineer.
  2. Protect structures from construction overloads.
- F. Beginning immediately after placement, protect concrete from premature drying, excessively hot and cold temperatures and mechanical injury.
- G. Continuously cure concrete for a period of not less than seven (7) days after placement.
  1. When seven-day cylinder breaks indicate, in the opinion of the Engineer, the possibility of low strength concrete, provide additional curing as per the request of the Engineer.
  2. When temperatures during the curing period fall below 40°F, provide additional curing time as directed by the Engineer.
- H. Unless otherwise directed by the Engineer, cure concrete not in contact with forms in accordance with one of the following procedures:
  1. Ponding or sprinkling: Keep entire concrete surface wet by continuously sprinkling or by allowing water to pond, covering all surfaces.
  2. Wet burlap: Thoroughly wet and cover all concrete surfaces with wet burlap mats as soon as the concrete has set sufficiently to avoid marring the surface.
    - a. Keep the burlap continuously wet during the curing period.
  3. Curing blankets: Thoroughly wet concrete surfaces to be cured and cover with curing blankets as soon as the concrete has set sufficiently to avoid marring the surface.
  4. Weight the blankets down to maintain close contact with the concrete surface.
    - a. Use sheets of waterproof kraft paper with the joints between sheets taped continuously; or
    - b. Use sheets of 4 mil or thicker polyethylene with the joints between sheets continuously taped.

5. Wet sand: Apply a layer of sand over the entire surface and keep it continuously wet.
  6. Curing compound: Apply curing compound immediately after completion of the finish on unformed surfaces and within two hours after removal of forms on formed surfaces.
    - a. Spray the entire surface with two coats of liquid curing compound, applying the second coat in the direction of 90° to the first coat.
    - b. Apply compound in accordance with the manufacturer' instructions to cover the surface with a uniform film which will seal thoroughly.
- I. Hot weather: When necessary, provide wind breaks, shading, fog spraying, sprinkling, ponding or wet covering with a light colored material applying as quickly as concrete hardening and finishing operations will allow.

### **3.10 SURFACE REPAIR**

- A. Patching mortar:
1. Make a patching mortar consisting of 1 part Portland cement to 2-1/2 parts sand by damp loose volume.
  2. Mix the mortar using one part acrylic bonding admixture to two parts water.
- B. Tie holes: Clean and dampen all tie holes and fill solidly with patching mortar.
- C. Surface defects:
1. Remove all defective concrete down to sound solid concrete.
  2. Chip edges perpendicular to the concrete surface or slightly undercut, allowing no feather edges.
  3. Dampen surfaces to be patched.
  4. Patch defects by filling solidly with repair mortar.
- D. Allow the Engineer to observe the work before placing the patching mortar.
- E. Repair defective areas greater than 1 sq. ft. or deeper than 1-1/2" as directed by the Engineer using materials approved by the Engineer at no additional expense to the Owner.

### **3.11 JOINTS**

- A. Construction joints:
1. Unless otherwise approved by the Engineer, provide construction joints as shown on the drawings.
  2. If additional construction joints are found to be required, secure the Engineer's approval of joint design and location prior to start of concrete placement.

3. Continue all reinforcing across construction joints and provide 1-1/2" deep keyways unless indicated otherwise on the drawings.
    - a. Form keyways in place.
  4. Provide waterstops in all construction joints of liquid containing structures, structures below grade or other structures as shown on the drawings.
- B. Expansion joints:
1. Provide expansion joints of size, type and locations as shown on the drawings.
  2. Do not permit reinforcement or other embedded metal items that are being bonded with concrete (except smooth dowels bonded on only one side of the joints, where indicated on the drawings) to extend continuously through any expansion joint.
  3. Provide waterstops where required.
- C. Control or contraction joints:
1. Locate and construct control and contraction joints in accordance with the Drawings.
  2. Where no specific joint pattern is indicated in slabs on grade or concrete pavements, submit a proposed joint layout to the Engineer for approval.
  3. Where no specific joint details are shown on the drawings, joints may be tooled, preformed or saw-cut.
  4. Saw-cut joints as soon as the concrete has hardened sufficiently to prevent aggregates from being dislodged by the saw.

### **3.12 FIELD QUALITY CONTROL**

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00.
- B. Provide free access to concrete operations at project site and cooperate with appointed firm.
- C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.
- D. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
- E. Concrete cylinder tests:
  1. During construction, prepare test cylinders for compressive strength testing, using 6" diameter by 12" long single use molds, and complying with ASTM C31.
    - a. Make a set of three test cylinders from each pour of 50 cubic yards or less, plus one additional set of cylinders for each additional 50 cubic yards or fraction thereof.

- b. Identify each and tag cylinder as to date of pour and location of concrete which it represents.
    - c. Deliver cylinders to testing lab selected by the Owner.
    - d. Cost for preparation and delivery of cylinders shall be borne by the Contractor. Cost for testing cylinders will be borne by the Owner.
  - 2. Should strengths shown by test cylinders fail to meet specified strengths for the concrete represented, then:
    - a. Engineer shall have the right to require changes in the mix proportions as he deems necessary on the remainder of the work.
    - b. Additional curing of those portions of the structure represented by the failed test cylinders shall be accomplished as directed by the Engineer.
    - c. Upon failure of the additional curing to bring the concrete up to specified strength requirements, strengthening or replacement of those portions of the structure shall be as directed by the Engineer.
    - d. The Engineer may require additional testing of concrete in question by either non-destructive methods such as the Swiss Hammer, Windsor Probe or Ultrasonics or by coring and testing the concrete in question in accordance with ASTM C42. Such testing shall be performed at no additional cost to the Owner.
- F. Other field concrete tests:
  - 1. Slump tests: Either the Engineer or a testing laboratory representative will make slump tests of concrete as it is discharged from the mixer.
    - a. Slump test may be made on any concrete batch at the discretion of the Engineer.
    - b. Failure to meet specified slump requirements (prior to addition of any superplasticizers) will be cause for rejection of the concrete.
  - 2. Temperature: The concrete temperature may be checked at the discretion of the Engineer.
  - 3. Entrained air: Air content of the concrete will be checked by a representative of the testing laboratory at the discretion of the Engineer.
- G. Coordination of laboratory services: The Contractor shall be responsible for coordination of laboratory services.
  - 1. Maintain a log recording quantities of each type of concrete placed, date and location of pour.
  - 2. Inform the testing laboratory of locations and dates of concrete placement and other information as required to be identified in the laboratory's test reports.
- H. Tests required because of extensive honeycombing, poor consolidation of the concrete or any suspected deficiency in the concrete will be paid for by the Contractor.



- I. Dimensional tolerances:
  - 1. Dimensional tolerances for allowable variations from dimensions or locations of concrete work, including the locations of embedded items shall be as given in ACI 301.
  - 2. Where anchor bolts or other embedded items are required for equipment installation, comply with the manufacturer's tolerances if more stringent than those stated in ACI 301.
  
- J. Watertight concrete:
  - 1. All liquid containing structures, basements or pits below grade shall be watertight.
  - 2. Any visible leakage or seepage shall be repaired as instructed by the Engineer at no expense to the Owner.
  - 3. Where physical evidence of honeycombing, cold joints or other deficiencies which may impair the watertightness of a structure exists, the Engineer may at his discretion call for leak testing of the structure.
    - a. Fill the structure with water and allow to stand for not less than 48 hours.
    - b. Make repairs on the structure until all visible leaks are sealed and the leakage rate of the water in the structure is less than 0.1% of the volume held in the structure per day.
    - c. The cost of testing and repairs shall be performed at no expense to the Owner.
  
- K. Concrete which fails to meet strength requirements, dimensional tolerances, watertightness criteria, or is otherwise deficient due to insufficient curing, improper consolidation or physical damage shall be replaced or repaired as instructed by the Engineer at no expense to the Owner.

### **3.13 DEFECTIVE CONCRETE**

- A. Test Results: The testing agency shall report test results in writing to Engineer and Contractor within 24 hours of test.
- B. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- C. Repair or replacement of defective concrete will be determined by the Engineer. The cost of additional testing shall be borne by Contractor when defective concrete is identified.
- D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Engineer for each individual area.

**END OF SECTION**

**SECTION 03 40 00**  
**PRECAST CONCRETE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Manholes
- B. Utility Vaults
- C. Headwalls

**1.02 RELATED SECTIONS**

- A. 03 30 00 - Cast-In Place Concrete

**1.03 REFERENCES**

- A. ACI 318 - Building Code Requirements for Reinforced Concrete and Commentary; American Concrete Institute International; 2014.
- B. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel; 1997a.
- C. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 1998.
- D. ASTM A 185 - Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement; 1997.
- E. ASTM A 416/A 416M - Standard Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete; 1998.
- F. ASTM A 497 - Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement; 1997
- G. ASTM A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement; 1996a.
- H. ASTM A 666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 1999.
- I. ASTM A 767/A 767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement; 1997.
- J. ASTM C 150 - Standard Specification for Portland Cement; 1999a.
- K. AWS D1.1 - Structural Welding Code - Steel; American Welding Society; 2000.
- L. AWS D1.4 - Structural Welding Code - Reinforcing Steel; American Welding Society; 1998.
- M. PCI MNL-116S - Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products; Precast/Prestressed Concrete Institute; 2013, Tenth Edition.
- N. PCI MNL-120 - PCI Design Handbook - Precast and Prestressed Concrete;

Precast/Prestressed Concrete Institute; 1999.

- O. PCI MNL-123 - Design and Typical Details of Connections for Precast and Prestressed Concrete; Precast/Prestressed Concrete Institute; 1988, Second Edition.

#### **1.04 DESIGN REQUIREMENTS**

- A. Size components to withstand design loads in a restrained condition as follows:
  - 1. Horizontal Assembly: 150 psf live and dead loads.
  - 2. Vertical Assembly: 20 psf wind load.
  - 3. As shown on the drawings.
- B. Maximum Allowable Deflection: 1/180 span.
- C. Design members exposed to the weather to provide for movement of components without damage, failure of joint seals, undue stress on fasteners or other detrimental effects, when subject to seasonal or cyclic day/night temperature ranges.
- D. Design system to accommodate construction tolerances, deflection of other building structural members and clearances of intended openings.

#### **1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate standard component configurations, design loads, deflections, cambers, and bearing requirements.
- C. Shop Drawings: Indicate layout, unit locations, fabrication details, unit identification marks, reinforcement, connection details, support items, dimensions, openings, and relationship to adjacent materials. Indicate design loads, deflections, cambers, bearing requirements, and special conditions.
- D. Samples: Submit two panels, 24 x 24 inch (610 x 610 mm) in size, illustrating surface finish treatment.
- E. Design Data: Submit design data reports indicating calculations for loadings and stresses of fabricated, designed framing.

#### **1.06 QUALITY ASSURANCE**

- A. Perform work of this section in accordance with requirements of PCI MNL-116S, PCI MNL-120, and PCI MNL-123.
- B. Fabricator Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- C. Erector Qualifications: Company specializing in erecting products of this section with minimum five (5) years of documented experience.
- D. Design precast concrete members under direct supervision of a Professional Structural Engineer experienced in design of precast concrete and licensed in the State of South Carolina.

- E. Welder: Qualified within previous 12 months in accordance with AWS D1.1 and AWS D1.4.

### **1.07 REGULATORY REQUIREMENTS**

Conform to ACI 318 for design load and construction requirements applicable to work of this section.

### **1.08 DELIVERY, STORAGE, AND HANDLING**

- A. Handle precast members in position consistent with their shape and design. Lift and support only from support points.
- B. Lifting or Handling Devices: Capable of supporting member in positions anticipated during manufacture, storage, transportation, and erection.
- C. Protect members to prevent staining, chipping, or spalling of concrete.
- D. Mark each member with date of production and final position in structure.

### **1.09 PROJECT/SITE CONDITIONS**

Coordinate the work of framing components not pre-tensioned but associated with the work of this section.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Precast Concrete:
  - 1. Sherman Precast.
  - 2. Tindall Concrete Products.
  - 3. Hanson
  - 4. Approved Equal.

### **2.02 MATERIALS**

- A. Cement: White Portland, conforming to ASTM C 150, Type I.
- B. Aggregate, Sand, Water, Admixtures: Determined by precast fabricator as appropriate to design requirements and PCI MNL-116S.

### **2.03 REINFORCEMENT**

- A. Tensioning Steel Tendons: ASTM A 416/A 416M, Grade 250 (1725); seven-wire stranded steel cable; low-relaxation type; full length without splices; uncoated.
- B. Reinforcing Steel: ASTM A 615/A 615M Grade 60 (420).
  - 1. Plain billet-steel bars.
  - 2. Unfinished.

3. Shop fabricated and bent cold.
- C. Welded Steel Wire Fabric: ASTM A 185 plain type; in flat sheets; unfinished.

#### **2.04 ACCESSORIES**

- A. Connecting and Supporting Devices: Plates, angles, items cast into concrete, and inserts conforming to PCI MNL-123, and as follows:
1. Material: Carbon steel conforming to ASTM A 36/A 36M.
  2. Finish: Prime painted, except where device surfaces will be in contact with concrete or will require field welding.
- B. Grout:
1. Non-shrink, non-metallic, minimum yield strength of 10,000 psi (69 MPa) at 28 days.
  2. Epoxy.
- C. Bearing Pads: High density plastic, Vulcanized elastomeric compound molded to size, Neoprene (Chloroprene), or Tetrafluoroethylene(TFE); Shore A Durometer; 1/8 inch (3 mm) thick, smooth both sides.
- D. Bolts, Nuts and Washers: High strength steel type recommended for structural steel joints.

#### **2.05 FABRICATION**

- A. Fabrication procedure to conform to PCI MNL-116S.
- B. Maintain plant records and quality control program during production of precast members. Make records available upon request.
- C. Ensure reinforcing steel, anchors, inserts, plates, angles, and other cast-in items are embedded and located as indicated on shop drawings.
- D. Tension reinforcement tendons as required to achieve design load criteria.
- E. Provide required openings with a dimension larger than 10 inches (250 mm) and embed accessories provided under other sections of the specifications, at indicated locations.

#### **2.06 FINISHES**

- A. Ensure exposed-to-view finish surfaces of precast concrete members are uniform in color and appearance.
- B. Cure members under identical conditions to develop required concrete quality, and minimize appearance blemishes such as non-uniformity, staining, or surface cracking.
- C. Architectural Finish: Surface holes or bubbles over 1/4 inch (6 mm) filled with matching cementitious paste, fins or protrusions removed and surface ground smooth.
- D. Precast manufacturer shall coat inside of all wet well structures and receiving manholes (manhole force main discharges into) with two-component, self-priming, chemically cured, coal tar epoxy protective coating. In accordance with Section 09 96 56.

## **2.07 FABRICATION TOLERANCES**

- A. Conform to PCI MNL-116S.
- B. Maximum Variation From Nominal Dimension: 1 inch (25 mm).
- C. Maximum Variation From Intended Camber: 5/8 inch (15 mm).
- D. Maximum Out of Square: 1/8 inch/10 feet (3 mm/3 m), non-cumulative.
- E. Maximum Misalignment of Anchors, Inserts, Openings: 1/8 inch (3 mm).
- F. Maximum Bowing of Members: Length of Bow/ 360.

## **2.08 SOURCE QUALITY CONTROL AND TESTS**

- A. Section 01 40 00 - Quality Requirements: Provide mix design for concrete.
- B. Test samples in accordance with applicable ASTM standard.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that site conditions are ready to receive work and field measurements are as shown on shop drawings.

### **3.02 PREPARATION**

- A. Prepare support equipment for the erection procedure, temporary bracing, and induced loads during erection.

### **3.03 WETWELLS AND UTILITY VAULTS**

- A. Concrete bases may be precast or cast-in-place. The concrete base of precast and cast-in-place structures shall be placed on an (eight) 8-inch No. 57 stone mat or as shown on the drawings. Each precast section shall have not more than two holes for the purpose of handling and laying. These holes shall be tapered and shall be plugged with rubber stoppers or mortar installation. Brick or concrete ring to support cover shall be a minimum of 3 inches high but not more than 18 inches high.
- B. Openings larger than 1 1/2 inches in diameter shall be precast into the appropriate section.
- C. Any openings added during construction shall be approved by the precast manufacturer and be formed by coring. No other method for adding holes will be considered.
- D. Joints of the precast sections shall be tongue and groove type. Sections shall be joined using O-ring rubber gaskets conforming to ASTM C443 or preformed mastic sealer. In addition, the joint shall be sealed inside and out with cement mortar using one part Portland cement to two parts clean sand meeting ASTM C144. The joints shall be watertight.
- E. Shaped bottoms shall be as shown on the drawings. They shall be constructed of one monolithic pour using 3000-psi concrete.

- F. Brickwork required to complete the precast concrete structures shall be constructed using mortar of one part Portland cement to two parts clean sand, meeting ASTM C144 and thoroughly mixed to a workable plastic consistency.
- G. Any damage to the coating during storage, handling, transportation or installation of the section shall be repaired immediately to provide complete coverage and protection per manufacturer's recommendations. Mortar joints shall receive two (2) coats of waterproofing after the section is installed and the mortar has set and dried.

### **3.04 ERECTION**

- A. Erect members without damage to structural capacity, shape, or finish. Replace or repair damaged members.
- B. Align and maintain uniform horizontal and vertical joints, as erection progresses.
- C. Maintain temporary bracing in place until final support is provided. Protect members from staining.
- D. Provide temporary lateral support to prevent bowing, twisting, or warping of members.
- E. Adjust differential camber between precast members to tolerance before final attachment.
- F. Install bearing pads.
- G. Level differential elevation of adjoining horizontal members with grout to maximum slope of 1:12.
- H. Set vertical units dry, without grout, attaining joint dimension with lead or plastic spacers.
- I. Grout underside of column bearing plates.
- J. Secure units in place. Perform welding in accordance with AWS D1.1.

### **3.05 ERECTION TOLERANCES**

- A. Erect members level and plumb within allowable tolerances.
- B. Conform to PCI MNL-116S.
- C. Design and erect to the following tolerances:
  - 1. Maximum Variation from Plane or Location Indicated on Drawings: 1/4 inch/10 feet and 3/8 inch in 100 feet (6 mm/3 m and 9 mm in 30 mm), non-cumulative.
  - 2. Maximum Offset from True Alignment Between Members: 1/4 inch (6 mm).
  - 3. Maximum Variation From Dimensions Indicated on Reviewed Shop Drawings: Plus or minus 1/8 inch (3 mm).
- D. Exposed Joint Dimension: 3/8 inch (9 mm) plus or minus 1/4 inch (6 mm).
- E. When members cannot be adjusted to conform to design or tolerance criteria, cease work and advise. Execute modifications as directed.

### **3.06 PROTECTION**

- A. Protect members from damage caused by field welding or erection operations.

B. Provide non-combustible shields during welding operations.

**3.07 CLEANING**

Clean weld marks, dirt, or blemishes from surface of exposed members.

**END OF SECTION**



## SECTION 31 00 00

### EARTHWORK

#### PART 1 GENERAL

##### 1.01 SCOPE

- A. This Section includes earthwork and related operations, including, but not limited to dewatering, excavating all classes of material encountered, pumping, draining and handling of water encountered in the excavations, handling, storage, transportation and disposal of all excavated and unsuitable material, construction of fills and embankments, backfilling around structures, compacting, all sheeting, shoring and bracing, preparation of subgrades, surfacing and grading, and any other similar, incidental, or appurtenant earthwork operations which may be necessary to properly complete the work.
- B. The Contractor shall provide all services, labor, materials, and equipment required for all earthwork and related operations, necessary or convenient to the Contractor, for furnishing complete work as shown on the Drawings or specified in these Contract Documents.

##### 1.02 RELATED SECTIONS

- A. Section 01 45 29 – Testing Laboratory Services
- B. Section 31 10 00 - Site Preparation
- C. Section 31 22 00 – Grading
- D. Section 31 23 16 - Excavation
- E. Section 31 25 00 - Erosion and Sedimentation Control

##### 1.03 GENERAL

- A. The elevations shown on the Drawings as existing are taken from the best existing data and are intended to give reasonably accurate information about the existing elevations. They are not precise and the Contractor shall become satisfied as to the exact quantities of excavation and fill required.
- B. Earthwork operations shall be performed in a safe and proper manner with appropriate precautions being taken against all hazards.
- C. All excavated and filled areas for structures, trenches, fills, topsoil areas, embankments, and channels shall be maintained by the Contractor in good condition at all times until final acceptance by the Owner. All damage caused by erosion or other construction operations shall be repaired by the Contractor using material of the same type as the damaged material.
- D. The Contractor shall control grading in a manner to prevent surface water from running into excavations. Obstruction of surface drainage shall be avoided and means shall be provided whereby storm water can be uninterrupted in existing gutters, other surface drains, or temporary drains. Free access must be provided to all fire hydrants and meters.
- E. Tests for compaction and density shall be conducted by an independent testing laboratory selected in accordance with Section 01 45 29 of these Specifications.
  - 1. The soils testing laboratory is responsible for the following:

- a. Field compaction testing shall be based on using the maximum dry density determined by the Standard Proctor Compaction Test in accordance with ASTM D 698.
  - b. Determination of in-place backfill density shall be done in accordance with ASTM D 1556, "Density and unit weight of Soil In Place by the Sand-Cone Method", ASTM D 2937, "Density of Soil In Place by the Drive-Cylinder Method" or ASTM D 2922, "Density of Soil and Soil-Aggregate In Place by Nuclear Methods (Shallow Depth)".
  - c. Field density tests for each lift; one test for each 5,000 square feet of fill or minimum one test per lift.
  - d. Inspecting and testing stripped site, subgrades and proposed fill materials.
2. Contractor's duties relative to testing include:
- a. Notifying laboratory of conditions requiring testing.
  - b. Coordinating with laboratory for field testing.
  - c. Providing representative fill soil samples to the laboratory for test purposes. Provide 50 pound samples of each fill soil.
3. Inspection
- a. Earthwork operations, suitability of excavated materials for fill and backfill, and placing and compaction of fill and backfill is subject to inspection. Engineer will observe earthwork operations.
  - b. Foundations and shallow spread footing foundations are required to be inspected by an engineer to verify suitable bearing and construction.
- F. All earthwork operations shall comply with the requirements of OSHA Construction Standards, Part 1926, Subpart P, Excavations, Trenching, and Shoring, and Subpart O, Motor Vehicles, Mechanized Equipment, and Marine Operations, and shall be conducted in a manner acceptable to the Engineer.
- G. It is understood and agreed that the Contractor has made a thorough investigation of the surface and subsurface conditions of the site and any special construction problems which might arise as a result of nearby watercourses and floodplains. The Contractor shall be responsible for providing all services, labor, equipment, and materials necessary or convenient to the Contractor for completing the work within the time specified in these Contract Documents.
- H. Safety
- Perform all trench excavation and backfilling activities in accordance with the Occupational Safety and Health Act of 1970 (PL 91-596), as amended. The Contractor shall pay particular attention to the Safety and Health Regulations Part 1926, Subpart P "Excavation, Trenching & Shoring" as described in OSHA publication 2226.

## PART 2 PRODUCTS

### 2.01 SOILS CLASSIFICATIONS

Bedding materials listed here include a number of processed materials plus the soil types defined according to the Unified Soil Classification System (USCS) in ASTM D 2487, Standard Method for Classification of Soils for Engineering Purposes. (See below for description of soil classification). These materials are grouped into five broad categories according to their suitability for this application:

- A. Class I - Angular, 1/4 to 1 1/2 inches (6 to 40 mm) graded stone, including such as coral, slag, cinders, crushed shells and crushed stone. Note - The size range and resulting high voids ratio of Class I material make it suitable for use to dewater trenches during pipe installation. This permeable characteristic dictates that its use be limited to locations where pipe support will not be lost by migration of other embedment materials into the Class I material. When such migration is possible, the material's minimum size range should be reduced to finer than 1/4 inch (6 mm) and the gradation properly designed to limit the size of the voids.
- B. Class II - Coarse sands and gravels with maximum particle size of 1 1/2 inch (40 mm), including variously graded sands and gravels containing small percentages of fines, generally granular and non-cohesive, either wet or dry. Soil Types GW, GP, SW and SP are included in this class. Note - Sands and gravels which are clean or borderline between clean and with fines should be included. Coarse-grained soils with less than 12% but more than 5% fines are neglected in ASTM D2487 and the USCS and should be included. The gradation of Class II material influences its density and pipe support strength when loosely placed. The gradation of Class II material influences its density and pipe support strength when loosely placed. The gradation of Class II material may be critical to the pipe support and stability of the foundation and embedment if the material is imported and is not native to the trench excavation. A gradation other than well graded, such as uniformly graded or gap graded, may permit loss of support by migration into void spaces of a finer grained natural material from the trench wall and foundation.
- C. Class III - Fine sand and clayey (clay filled) gravels, including fine sands, sand-clay mixtures and gravel-clay mixtures. Soil Types SM, GC, SM, and SC are included in this class.
- D. Class IV - Silt, silty clays and clays, including inorganic clays and silts of not to high plasticity and liquid limits. Soil Types MH, ML, CH, and CL are included in this class. Note- Caution should be used in the design and selection of the degree and method of compaction for Class IV soils because of the difficulty in properly controlling the moisture content under field conditions. Some Class IV soils with medium to high plasticity and with liquid limits greater than 50% (CH, MH, CH-MH) exhibit reduced strength when wet and should only be used for bedding, haunching and initial backfill in arid locations where the pipe embedment will not be saturated by ground water, rainfall and/or exfiltration from the pipeline system. Class IV soils with low to medium plasticity and with liquid limits lower than 50% (CL, ML, CL-ML) also require careful consideration in design and installation to control moisture content but need not be restricted in use to arid locations.
- E. Class V - This class includes the organic soils OL, OH, and PT as well as soils containing frozen earth, debris, rocks larger than 1 1/2 inch (40 mm) in diameter, and other foreign materials. These materials are not recommended for bedding, haunching or initial backfill.

## DESCRIPTION OF EMBEDMENT MATERIAL CLASSIFICATIONS

SOIL CLASS	SOIL TYPE	DESCRIPTION MATERIAL CLASSIFICATION
Class I Soils *	---	Manufactured angular, granular material, 3/4 to 1 1/2 inches (6 to 40 mm) size, including materials having regional significance such as crushed stone, or rock, broken coral, crushed slag, cinders, or crushed shells.
Class II Soil **	GW	Well-graded gravels and gravel-sand mixtures, little or no fines. 50% or more retained on No. 4 sieve. More than 95% retained on No. 200 sieve. Clean..
	GP	Poorly graded gravels and gravel-sand mixtures, little or no fines. 50% or more retained on No. 4 sieve. More than 95% retained on No. 200 sieve. Clean
	SW	Well-graded sands and gravelly sands, little or no fines. More than 50% passes No. 4 sieve. More than 95% retained on No. 200 sieve. Clean.
	SP	Poorly graded sands and gravelly sand, little or no fines. More than 50% passes No. 4 sieve. More than 95% retained on No. 200 sieve. Clean.
Class III Soil ***	GM	Silty gravels, gravel-sand-silt mixtures. 50% or more retained on No. 200 sieve.
	GC	Clayey gravels, gravel-sand-clay mixtures. 50% or more retained on No. 4 sieve. More than 50% retained on No. 200 sieve.
	SM	Silty sands, sand-silt mixtures. More than 50% passes No. 4 sieve. More than 50% retained on No. 200 sieve.
	SC	Clayey sands, sand-clay mixtures. More than 50% passes No. 4 sieve. More than 50% retained on No. 200 sieve.
Class IV Soils	ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands. Liquid limit 50% or less. 50% or more passes No. 200 sieve.
	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays. Liquid limit 50% or less. 50% or more passes No. 200 sieve.
	MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts. Liquid limit greater than 50%. 50% or more passes No. 200 sieve.
	CH	Inorganic clays of high plasticity, fat clays. Liquid limit greater than 50%. 50% or more passes No. 200 sieve.
Class V Soils	OL	Organic silts and organic silty clays of low plasticity. Liquid limit 50% or less. 50% or less. 50% or more passes No. 200 sieve.
	OH	Organic clays of medium to high plasticity. Liquid limit 50% or less. 50% or more passes No. 200 sieve.

PT Peat, muck and other highly organic soils.

\* Soils defined as Class I materials are not defined in ASTM D2487.

\*\* In accordance with ASTM D2487, less than 5% pass No. 200 sieve.

\*\*\* In accordance with ASTM D2487, more than 12% pass No. 200 sieve. Soils with 5% to 12% pass No. 200 sieve fall in borderline classification, e.g. GP-GC.

## **2.02 FILL MATERIAL**

- A. Sand Fill: Material shall consist of a clean sand with a fineness modulus of 1.6 to 3.1 and containing not more than 10 percent by weight finer than No. 200 U.S. Standard Sieve.
- B. Earth Fill: Material shall consist of inorganic material free of roots, cobbles and boulders and classified as SM, ML, SC, or CL by ASTM D2487-85 "Standard Methods for Classification of Soils for Engineering Purposes". Earth Fill shall also conform to the following:
  - 1. Liquid Limit = 50 maximum
  - 2. Plasticity Index = 20 maximum
  - 3. Dry Unit Weight = 90 pcf minimum maximum density

## **2.03 UNSUITABLE SITE FILL MATERIAL**

- A. Material which does not conform to the above classifications (soil classification SP, SW, GM, CH, MH, OH, OL and PT) may be used as Site Fill material in areas identified on the drawings as "spoil areas", in areas with no structures and or roads and other non-critical areas.

## **2.04 SHEETING, BRACING AND TIMBERING**

- A. Sheeting, Bracing and Timbering: The Contractor shall furnish, place and maintain all sheeting, bracing and timbering required to properly support trenches and other excavations in open cut and to prevent all movement of the soil, pavement, structures, or utilities outside of the trench or pit.
  - 1. General
    - a. Cofferdams and bracing design, including computations, shall be prepared before commencing construction operations. Drawings and design computations shall be signed and sealed by a Professional Engineer registered in the State of South Carolina. The drawings and design computations shall be submitted to the Engineer for informational purposes only.
    - b. Sheeting, bracing and timbering shall be so placed as to allow the work to be constructed to the lines and grades shown on the Drawings and as ordered by the Engineer.
    - c. If at any time the method being used by the Contractor for supporting any material or structure in or adjacent to any excavation is not reasonably safe, the Contractor shall provide additional bracing and support necessary to furnish the added degree of safety.
    - d. All sheeting in contact with the concrete or masonry shall be cut off as directed by the Engineer and left in place.

2. Timber: Timber may be substituted for steel sheet piling when approved by the Engineer. Timber for shoring, sheeting or bracing shall be sound and free of large or loose knots, and in good condition. Size and spacing shall be in accordance with OSHA regulations.
3. Steel Sheet Piling: Steel sheet piling shall be the continuous interlock type. The weight, depth, and section modulus of the sheet piling shall be sufficient to restrain the loads of earth pressure and surcharge from existing foundations and/or live loads. Procedure for installation and bracing shall be so scheduled and coordinated with the removal of the earth that the ground under existing structures shall be protected against lateral movement at all times. The Contractor shall provide closure and sealing between sheet piling and existing facilities. Steel piling shall be removed, unless otherwise directed by the Engineer.
4. Remove bracing and sheeting in units when backfill reaches the point necessary to protect the structures and adjacent property. Leave sheeting in place when, in the opinion of the Engineer, it cannot be safely removed. Cut off sheeting left in place at least two feet below the surface.

## 2.05 FILTER FABRIC

- A. Filter fabric associated with bedding shall be a UV stabilized, spunbonded, continuous filament, needle punched, polypropylene, nonwoven geotextile.
- B. The fabric shall have an equivalent open size (EOS or AOS) of 120 - 70. The fabric shall also conform to the minimum property values listed in the following table:

Fabric Property	Unit	Test Procedure	Average Value	
			Typical	Minimum
Weight	oz/yd <sup>2</sup>	ASTM D 3776	8.3	
Thickness	mils	ASTM D 1777	105	
Grab Strength	lbs.	ASTM D 4632	240	210
Grab Elongation	%	ASTM D 4632	>50	50
Tear Strength	lbs.	ASTM D 4533	100	85
Mullen Burst	psi	ASTM D 3786	350	320
Puncture Resistance	lbs.	ASTM D 4833	115	100
Permittivity	sec <sup>-1</sup>	ASTM D 4491	1.7	
Water Permeability	cm/sec	ASTM D 4491	0.4	
Water Flow Rate	gpm/ft <sup>2</sup>	ASTM D 4491	120	
UV Resistance (500 hrs)	%	ASTM D	>85	

		4355		
pH			2 – 13	

C. Filter fabric shall be Polyfelt TS 700, Trevira 1125 or SuPac 7-MP.

**2.06 CONCRETE**

Concrete for initial backfill or encasement shall have a compressive strength of not less than 3,000 psi, with not less than 5.5 bags of cement per cubic yard and a slump between 3 and 5-inches. Ready-mixed concrete shall be mixed and transported in accordance with ASTM C 94. Reinforcing steel shall conform to the requirements of ASTM A 615, Grade 60.

**PART 3 EXECUTION**

**3.01 GENERAL**

A. Safety: Comply with local regulations and with the provisions of the “Manual of Accident Prevention in Construction” of the Associated General Contractors of America, Inc., Occupational Safety and Health Act and all other applicable safety regulations.

B. Topsoil

1. Remove all topsoil to a depth at which subsoil is encountered, from all areas under buildings, pavements, and from all areas which are to be cut to lower grades or filled.
2. With the Engineer's approval, topsoil to be used for finish grading may be stored on the site.
3. Other topsoil may be used for fill in non-critical areas with approval of the Engineer.
4. Properly dispose of all excess topsoil in the designated area.

C. Bracing and Sheeting

1. Furnish, put in place, and maintain all sheeting, bracing, and shoring as may be required to properly support the sides of all excavations and to prevent all movement of earth which could in any way injure the work, adjacent property or workers.
2. Properly support all excavations where necessary to conform to all pertinent rules and regulations and these Specifications, even though, such locations are not indicated on the Drawings.
3. Exercise care in the removal of sheeting, shoring, bracing and timbering to prevent collapse or caving of the excavation faces being supported and damage to the work and adjacent property.
4. Do not leave any sheeting or bracing in the trench or excavation after completion of the work, unless approved by the Engineer.

D. Obstructions

1. Remove and dispose of all boulders, sidewalks, driveways, pavement, pipes, and the like, as required for the performance of the work.

2. Exercise care in excavating around catch basins, inlets and manholes so as to not disturb or damage these structures.
3. Avoid removing or loosening castings or pushing dirt into catch basins, inlets and manholes.
4. Damaged or displaced structures or casting shall be repaired, replaced and dirt entering the structures during the performance of the work shall be removed at no additional cost to the Owner.

E. Utilities to be Abandoned

1. When pipes, conduits, sewers, or other structures are removed from the trench, leaving dead ends in the ground, such ends shall be fully plugged or sealed with brick and non-shrink grout.
2. Abandoned structures such as manholes or chambers shall be entirely removed.
3. All materials from abandoned utilities shall be removed from the site.
4. All salvageable materials shall become the property of the Owner.
5. All equipment to be salvaged is noted in the Specifications and shall be turned over to the Owner at a designated location.

F. Extra Earth Excavation

1. In case soft or excessively wet material which, in the opinion of the Engineer, is not suitable, is encountered below the final subgrade elevation of an excavation or underneath a structure, the Engineer may order the removal of this material and its replacement with crushed stone, filter fabric, or other suitable material in order to make a suitable foundation for the construction of the structure.

G. Cutting Paved Surfaces and Similar Improvements

1. Remove existing pavement as necessary for installing pipe utilities and appurtenances or as otherwise shown on the Drawings.
2. Before removing any pavement, mark the pavement neatly, paralleling pipe lines and existing street lines. Space the marks the width of the trench.
3. Break asphalt pavement along the marks using rotary saws or other suitable tools. Break concrete pavement along the marks by use of scoring with a rotary saw and breaking below the score by the use of jackhammers or other suitable tools.
4. Do not pull pavement with machines until completely broken and separated from pavement to remain.
5. Do not disturb or damage the adjacent pavement. If the adjacent pavement is disturbed or damaged, remove and replace the damaged pavement. No additional payment will be made for removing and replacing damaged adjacent pavement.
6. Remove and replace sidewalks disturbed by construction for their full width and to the nearest undisturbed joint.
7. The Contractor may tunnel under curbs that are encountered. Remove and replace



any curb disturbed by construction to the nearest undisturbed joint.

### **3.02 EXCAVATION**

#### **A. Method**

1. All excavation shall be by open cut from the surface except as indicated on the Drawings.
2. All excavations for pipe appurtenances and structures shall be made in such a manner, and to such depth and width, as will give ample room for building the structures, and for bracing, sheeting, and supporting the sides of the excavation, for pumping and draining groundwater which may be encountered, and for the removal from the excavation of all materials excavated.
3. Take special care so that the soil below the bottom of the structure to be built is left undisturbed.

#### **B. Grades: Excavate to grades indicated on the Drawings. Where excavation grades are not indicated on the Drawings, excavate as required to accommodate installation.**

#### **C. Disposal of Excavated Material**

1. Remove and properly dispose of all excavated material not needed to complete filling, backfilling and grading.
2. Dispose of excess earth and rock excavated materials at locations on-site designated by the Engineer. Off-site disposal of all other material shall be and in accordance with all requirements of federal, state, county, and municipal regulations. No debris of any kind shall be deposited in any stream or body of water, or on any street. No debris shall be deposited on any private property, except by written consent of the property owner. In no case shall any material be shoved onto abutting private properties, or be buried in embankments or trenches on the Project.

### **3.03 EXCAVATING FOR STRUCTURES**

#### **A. Earth Excavation: Earth excavation shall include all substances to be excavated other than rock. Earth excavation for structures shall be to limits not less than two feet outside wall lines, to allow for formwork and inspection, and further as necessary to permit the trades to install their work. All materials loosened or disturbed by excavation shall be removed from surfaces to receive concrete or crushed stone.**

#### **B. Excavation for Foundations: Footings and slabs on grades shall rest on undisturbed earth, rock or compacted materials to insure proper bearing.**

1. **Unsuitable Foundation Material:** Any material, in the opinion of the Engineer, which is unsuitable for foundation shall be removed and replaced with compacted crushed stone, or with compacted fill material as directed by the Engineer. No determination of unsuitability will be made until all requirements for dewatering are satisfactorily met.
2. **Pipe Trenches Beneath Structures:** Where piping or conduit passes beneath footings or slabs resting on grade, trenches shall be excavated to provide a minimum 6-inch clearance from all surfaces of the pipe or conduit. The trench shall be backfilled to the base of the structure with concrete.
3. **Unauthorized Excavation:** Care shall be taken that excavation does not extend

below bottom levels of footings or slabs on earth. Should the excavation, through carelessness or neglect, be carried below such levels, the Contractor shall fill in the resulting excess excavation with concrete under footings and compacted crushed stone or other approved material under slabs. Should excavation be carried beyond outside lines of footings such excess excavation shall be filled with concrete, or formwork shall be provided, as directed by the Engineer.

- C. Unsuitable Bearing
  - 1. If suitable bearings for foundations are not encountered at the elevations indicated on the Drawings, immediately notify the Engineer.
  - 2. Do not proceed further until instructions are received.

### **3.04 DEWATERING REQUIREMENT**

- A. The Contractor may use any dewatering method he deems feasible so long as it results in working in the dry and stable soil conditions.
- B. The Contractor shall conform and meet all conditions, obtain necessary permits and requirements of the regulatory agencies that have jurisdiction.
- C. It is the intent of these specifications that an adequate dewatering system be installed to lower and control the groundwater in order to permit excavation, construction, grading and the placement of fill materials, all to be performed under dry conditions. The dewatering system shall be adequate to pre-drain the water-bearing strata above and below the bottom of the excavation.
- D. The Contractor shall be solely responsible for the arrangement, location and depths of dewatering system necessary to accomplish the work described under this section of the specifications. The dewatering shall be accomplished in a manner that will reduce the hydrostatic head below any excavation to the extent that the water level in the construction area are a minimum of three (3) feet below the prevailing excavation surface and any surface to be compacted; will prevent the loss of fines, seepage, boils, quick conditions, or softening of the foundation strata; will maintain stability of the sides and bottom of the excavation; and will result in all construction operations being performed in the dry.
- E. The Contractor shall promptly dispose of all water removed from the excavations in such a manner as will not endanger public health, damage public or private property, or affect adversely any portion of the work under construction or completed by him or any other Contractor. Contractor shall obtain written permission from the Owner for any property involved before digging ditches or constructing water courses for the removal of water.
- F. The disposal of water from the dewatering system shall meet the requirements of all regulatory agencies having jurisdiction.
- G. If the dewatering requirements are not satisfied due to inadequacy or failure of the dewatering system, then loosening of the foundation strata, or instability of the slopes, or damage to the foundations or structures may occur. The supply of all labor and materials, and the performance of all work necessary to carry out additional work for reinstatement of the structures of foundation soil resulting from such inadequacy or failure shall be undertaken by the Contractor subject to the approval of the Engineer, and at no additional expense to the Owner.

### **3.05 COMPACTION**

- A. Fill materials supporting roadways, parking areas, sidewalks, structures, and buildings and backfill around structures shall be compacted to 95 percent of the standard proctor density. The top 12-inches of fill materials supporting structures or pavement shall be compacted to 98 percent of the standard proctor density. Fill placed for general site grading shall be compacted to 90 percent of the standard proctor density.
- B. Compaction of embankments shall be by vibratory sheepsfoot or pad-foot rollers with staggered, uniformly spaced knobs and suitable cleaning devices. The projected area of each knob and the number and spacing of the knobs shall be such that the total weight of the roller and ballast when distributed over the area of one row of knobs shall be 250 psi. Placement and compaction of materials shall extend at least 5 feet beyond the final contours sufficiently to insure compaction of the material at the resulting final surface. Final contours shall then be achieved by a tracked bulldozer shaping the face of the embankment.
- C. Compaction of backfill next to walls shall be accomplished with hand-powered tamping equipment. The backfill shall be placed in 8-inch maximum lifts, with each lift compacted to 95 percent of standard proctor density.
- D. If tests indicate that density of fill is less than that specified, the area shall be, as directed by the Engineer, either recompacted or undercut, filled, and compacted until specified density is achieved.

### **3.07 FILL**

- A. Controlled Fill
  - 1. The fill for roadways, parking areas, walks, structures, and building slabs on grade shall be controlled fill.
  - 2. After the existing ground or excavated area has been proofrolled and examined by the Engineer, all holes and other irregularities shall be filled and compacted before the main fill is placed.
  - 3. The fill shall be placed in even layers not exceeding 8-inches in depth and shall be thoroughly compacted as herein specified.
  - 4. If an analysis of the soil being placed shows a marked difference from one location to another, the fill being placed shall not be made up of a mixture of these materials.
  - 5. Each different type of material shall be handled continuously so that field control of moisture and density may be based upon a known type of material.
  - 6. No fill shall be placed following a heavy rain without first making certain on isolated test areas that compaction can be obtained without damage to the already compacted fill.
- B. Proofrolling
  - 1. All areas where roadways, parking areas, sidewalks, structures, and buildings are to be constructed on cut areas, compacted fill, and other areas where indicated on the Drawings, shall be proofrolled to detect soft spots prior to the placement of fill material or building foundations.

2. Proofrolling shall be performed using a fully loaded tandem-axle dump truck 20 tons or other suitable pneumatic tired equipment over the subgrade before the subgrade is shaped.
3. Proofrolling shall be witnessed by the Engineer.
4. Subgrade shall be proofrolled with 10 overlapping passes of the roller. Depressions that develop during the proofrolling operation shall be filled with suitable material and those filled areas shall be proofrolled with six passes of the roller. If, after having been filled and proofrolled, the subgrade areas that still “pump” or “rut”, shall be further evaluated by a geotechnical engineer, and remedial work be determined based on the conditions found at locations under structures or pavement. The contractor shall execute remedial work determined by the geotechnical engineer to achieve a subgrade acceptable to the Engineer.
5. After the proofrolled subgrade has been accepted by the Engineer, the surface of the subgrade shall be finish rolled with a smooth steel wheel roller weighing not less than 10 tons. Finished surface of the subgrade shall be within a tolerance of 1/4-inch at every point.
6. Conduits, pipes, culverts, and underdrains shall be neither disturbed nor damaged by proofrolling operations. Rollers shall neither pass over, nor approach closer than five feet to, conduits, pipes, culverts, and underdrains unless the tops of those products are deeper than three feet.

C. Placement

1. Prior to placement of any material in embankments, the area within embankment limits shall be stripped of topsoil and all unsuitable materials removed in accordance with this Section. The area shall then be scarified to a depth of at least 6-inches.
2. Fill materials shall be placed in continuous, approximately horizontal layers extending the full width of the embankment cross-section and the full dimension of the excavation where practical and having an uncompacted thickness of not over 8-inches.

D. Final Grading: Upon completion of construction operations, the area shall be graded to finish contour elevations and grades shown on the Drawings. Graded areas shall be made to blend into conformation with remaining ground surfaces. All surfaces shall be left smooth and free to drain.

E. Excess Material: Surfaces and slopes of waste fills shall be left smooth and free to drain.

F. Moisture

1. Fill materials shall be placed at optimum moisture content within practicable limits, but not less or more than two percent of optimum. Optimum moisture shall be maintained by sprinkling the layers as placed or by allowing materials to dry before placement.
2. If fill material is too wet, provide and operate approved means to assist the drying of the fill until suitable for compaction.
3. If fill material is too dry, provide and operate approved means to add moisture to the fill layers.

### **3.08 BACKFILLING**

- A. Backfill carefully to restore the ground surface to its original condition. Dispose of excess material in accordance with this Section.
- B. Compact backfill underlying roadways, parking areas, sidewalks, structures and buildings in accordance with the requirements of Article 3.06 of this Section.
- C. Backfilling Around Structures
  - 1. General
    - a. Remove debris from excavations before backfilling.
    - b. Do not backfill against foundation walls until so directed by the Engineer nor until all indicated perimeter insulation and/or waterproofing is in place.
    - c. Protect such insulation and/or waterproofing during filling operations.
    - d. Do not backfill against water retaining structures until successful leakage tests have been completed.
    - e. Wherever possible, backfilling shall be simultaneous on both sides of walls to equalize lateral pressures.
    - f. Do not backfill against walls until all permanent construction is in place to furnish lateral support on both top and bottom of wall.
    - g. Backfilling against walls shall take place after all the concrete in the affected members has attained the specified strengths.
    - h. To prevent excessive lateral pressure on external walls, large compaction equipment shall not be allowed within a zone wall footing.
  - 2. Materials: Backfill material placed against structures built or encountered during the work of this Section shall be suitable fill material. No broken concrete, bricks or similar materials will be permitted as backfill.

### **3.09 GRADING**

- A. General: Perform all rough and finish grading required to attain the elevations indicated on the Drawings. Perform finish grading to an accuracy of  $\pm 0.10$  foot.
- B. Treatment After Completion of Grading
  - 1. After grading is completed, permit no further excavation, filling or grading, except with the approval of the Engineer.
  - 2. Use all means necessary to prevent the erosion of freshly graded areas during construction and until such time as permanent drainage and erosion control measures have been installed.

### **3.09 SETTLEMENT**

- A. The Contractor shall be responsible for all settlement of backfill, fills and embankments which may occur within one year after final acceptance of the Work by the Owner.

- B. The Contractor shall make, or cause to be made, all repairs or replacements made necessary by settlement within 30 days after receipt of written notice from the Engineer or Owner.

**3.13 CLEAN-UP**

- A. Leave unused materials in a neat, compact stockpile.
- B. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.
- C. Leave borrow areas in a clean and neat condition. Grade to prevent standing surface water.

**END OF SECTION**

**SECTION 31 10 00**  
**SITE PREPARATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Selective demolition of built site elements.
- B. Clearing and protection of vegetation.
- C. Removal of existing debris.

**1.02 RELATED SECTIONS**

- A. Section 31 25 00 - Erosion and Sedimentation Control.
- B. Section 01 74 00 - Waste Management: Limitations on disposal of removed materials; requirements for recycling.
- C. Section 31 11 00- Clearing and Grubbing.
- D. Section 31 22 00 – Grading.
- E. Section 31 23 16 - Excavation.
- F. Section 31 23 23.13 – Backfill and Compaction.

**1.03 REFERENCES**

- A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.
- B. NFPA 241 - Standard for Safeguarding Construction, Alteration and Demolition Operations; 2013.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Site Plan: Showing:
  - 1. Vegetation removal limits.
  - 2. Areas for temporary construction and field offices.
  - 3. Areas for temporary and permanent placement of removed materials.
- C. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

**1.05 PROJECT CONDITIONS**

- A. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

## **PART 2 PRODUCTS – NOT USED**

## **PART 3 EXECUTION**

### **3.01 EXISTING UTILITIES**

- A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without permit from authority having jurisdiction.
- D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least seven (7) days prior written notification to Owner.
- E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least three (3) days prior written notification to Owner.
- F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.
- G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.
- H. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone; identify and mark utilities to be subsequently reconnected, in same manner as other utilities to remain.

### **3.02 VEGETATION**

- A. Scope: Remove trees, shrubs, brush, and stumps in areas to be improved.
- B. Do not begin clearing until vegetation to be relocated has been removed.
- C. Do not remove or damage vegetation beyond the following limits:
  - 1. Limits of Disturbance as illustrated on Construction Drawings
  - 2. 25 feet outside perimeter of pervious paving areas that must not be compacted by construction traffic.
  - 3. Exception: Specific trees and vegetation indicated on drawings to be removed.
  - 4. Exception: Selective thinning of undergrowth specified elsewhere.
- D. In areas where vegetation must be removed but no construction will occur other than pervious paving, remove vegetation with minimum disturbance of the subsoil.
- E. Vegetation Removed: Do not burn, bury, landfill or leave on site, except as indicated.
  - 1. Chip, grind, crush, or shred vegetation for mulching, composting, or other purposes; preference should be given to on-site uses.



2. Trees: Sell if marketable; if not, treat as specified for other vegetation removed; remove stumps and roots to depth of 18 inches.
  3. Existing Stumps: Treat as specified for other vegetation removed; remove stumps and roots to depth of 18 inches.
  4. Sod: Re-use on site if possible; otherwise sell if marketable, and if not, treat as specified for other vegetation removed.
  5. Fill holes left by removal of stumps and roots, using suitable fill material, with top surface neat in appearance and smooth enough not to constitute a hazard to pedestrians.
- F. Dead Wood: Remove all dead trees (standing or down), limbs, and dry brush on entire site; treat as specified for vegetation removed.
- G. Restoration: If vegetation outside removal limits or within specified protective fences is damaged or destroyed due to subsequent construction operations, replace at no cost to Owner.

### **3.03 DEBRIS**

- A. Remove debris, junk, and trash from site.

### **3.04 WASTE REMOVAL**

- A. Remove from site all materials not to be reused on site; comply with requirements of Section 01 74 19 - Waste Management.
- B. Leave site in clean condition, ready for subsequent work.
- C. Clean up spillage and wind-blown debris from public and private lands.

### **3.05 MEASUREMENT AND PAYMENT**

- A. No separate measurement or direct payment will be made for the work under this section and all costs for same shall be included in the overall lump sum bid for this project.

**END OF SECTION**

**SECTION 31 11 00**  
**CLEARING AND GRUBBING**

**PART 1 GENERAL**

**1.01 DESCRIPTION**

- A. Work included: Remove all organic vegetative mater as required to complete the construction as indicated on the construction plans.
- B. Related work:
  - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
  - 2. Section 01 71 23 - Field Engineering.
  - 3. Section 02 41 00 – Demolition.
  - 4. Section 31 10 00 - Site Preparation.
  - 5. Section 31 25 00 - Erosion and Sedimentation Control.
  - 6. Section 32 92 00 – Turf and Grasses.

**1.02 QUALITY ASSURANCE**

- A. Use required number of workmen that are properly trained and have experience in the crafts and who are completely familiar with the specified requirements herein and the methods for proper performance of the work specified in this section.
- B. Use the proper equipment that is adequate in size, capacity and numbers to accomplish the work within the timeframe of the Project schedule.
- C. Comply with requirements of governmental agencies having jurisdiction within the Project area.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 AREA INCLUDED**

- A. All areas where new construction is taking place, or as illustrated on the plans.

**3.02 PROCEDURES**

- A. Clearing and grubbing: The entire area within the limits described above shall be cleared and grubbed at a minimum depth of 6-inches.
- B. Areas that are to be selectively cleared shall consist of removing vegetation, brush, stumps, etc., from the area. Special care shall be taken to avoid damage to trees that are left. Grubbing will not be required in areas designated for selective clearing.

- C. Removal of trees and shrubs: All trees being taken down must be removed avoiding damage to trees and existing features that are to remain. All parts of the trees being removed are to be completely taken from the site and properly disposed of. Contractor at their discretion may grind trees and stumps for use as erosion control material along stockpile slopes and in between double row silt fence. Any shrubs or small trees that are undesirable may be selectively removed as directed.
- D. Stumps and roots: All stumps and roots larger than 2-inches in diameter shall be completely removed by grubbing except in areas of building site, parking areas and drives; they must be cut off no less than 18-inches below any subgrade. The area of operation then shall be cleared of resulting debris and matted roots, weeds and other organic matter shall be hauled away from the site. Generally, all material that cannot be compacted to 90-percent maximum density in lawn areas and 95-percent of maximum density elsewhere must be removed.
- E. Protection of trees: Trees that are to remain in place will need to be protected in areas where earthwork cut or fill is eighteen inches or less and in existing parking areas. Contractor must obtain approval from Engineer prior to removal of significant trees covered by local tree ordinances. Existing trees that are remaining in place during and after construction must be protected by constructing barricades around each tree.
- F. Erosion and Sediment Control: Construct and maintain erosion and sediment control devices as illustrated on the construction plans and in accordance with Section 31 25 00 of these specifications.

### **3.03 MEASUREMENT AND PAYMENT**

- A. Payment will be made at the unit price per "acre" as stated in the Bid Form for clearing and grubbing.

**END OF SECTION**

## SECTION 31 22 00

### GRADING

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Work included: Cut, fill, excavate, backfill, compact and grade the site as necessary to bring the roads, drives, building sites, paved areas and open areas to the lines and grades shown on the drawings.
  - 1. The work includes, but is not necessarily limited to:
    - a. Building site preparation.
    - b. Roadway, parking area, drive and walk subgrade preparation.
    - c. Excavations and formations of embankments.
    - d. Dressing of graded areas, shoulders and ditches.
  - 2. Subsurface Classification: All excavation is unclassified and excavation of every description, regardless of material encountered within the grading limits of the project, shall be performed to the lines and grades indicated.
- B. Removal and storage of topsoil.
- C. Rough grading the site for improvements.
- D. Topsoil and finish grading.

##### 1.02 RELATED SECTIONS

- A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, and Sections in Division 1 of these specifications.
- B. Section 31 11 00 - Clearing and Grubbing.
- C. Section 31 23 16 - Excavation.
- D. Section 31 23 16.13 – Trenching for Site Utilities.
- E. Section 31 23 23.13 - Backfill and Compaction.
- F. Section 31 25 00 - Erosion and Sedimentation Controls.
- G. Section 32 11 23 - Aggregate Base Course.
- H. Section 32 92 00 - Turf and Grasses.

##### 1.03 Definitions

- A. Open areas: Open areas shall be those areas that do not include building sites, paved areas, street right-of-way and parking areas.

- B. Maximum density: Maximum weight in pounds per cubic foot of a specific material.
- C. Optimum moisture: Percentage of water in a specific material at maximum density.
- D. Rock excavation: Excavation of any hard natural substance which requires the use of explosives and/or special impact tools such as jack hammers, sledges, chisels or similar devices specifically designed for use in cutting or breaking rock, but exclusive of trench excavating machinery. To be considered as rock excavation, the material shall be continuous; individual boulders or rocks in soil will not be considered rock excavation.
- E. Muck: Materials unsuitable for foundation because of organic content, saturation to the extent that it is somewhat fluid and must be removed by dragline, dredge or other special equipment, are designated as muck. No extra payment will be made for muck removal.
- F. Unsuitable material: Unsuitable material is defined as earth material unsatisfactory for its intended use and as classified by the soils technician. In addition to organic matter, sod, muck, roots and rubbish, highly plastic clay soils of the CH and MH descriptions, and organic soils of the OL and OH descriptions, as defined in the Unified Soil Classification System shall be considered as unsuitable material.
- G. Suitable material: Where the term suitable material is used in specification sections pertaining to earthwork, it means earth or materials designated as being suitable for their intended use by soils technicians or the Engineer. Suitable material shall be designated as meeting the requirements of the Unified Soil Classification System types SW, GW, GC, SC, SM, ML, CL or as designated in these specifications.
- H. Select material: Select material is defined as granular material to be used where indicated on the drawings or where specified herein consisting of soils conforming to the Unified Soil Classification types SW, SM, GW or GM or as otherwise approved by the Engineer as select fill. Select material shall contain no stones or rubble larger than 1-1/2" in diameter.
- I. Crushed stone (gravel): Crushed stone shall be No. 57 aggregate or equal conforming to ASTM C-33.
- J. Excavation: Excavation is defined as unclassified excavation of every description regardless of materials encountered.

#### **1.04 SUBMITTALS**

- A. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

#### **1.05 QUALITY ASSURANCE**

- A. Perform Work in accordance with State of South Carolina, Department of Transportation standards.
- B. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- C. Comply with requirements of governmental agencies having jurisdiction.

- D. A testing laboratory, approved by the Owner, will make such tests as are deemed advisable. Testing shall be as specified in Section 01 45 29, Testing Laboratory Services.
- E. The Contractor shall schedule his work so as to permit a reasonable time for testing before placing succeeding lifts of fill material and shall keep the laboratory informed of his progress. The cost of the initial tests shall be paid for by the Contractor. Subsequent tests required as a result of improper compaction shall also be paid for by the Contractor.
- F. Contractor shall provide all required equipment and contact Engineer to setup time for Proof Roll Testing across all areas that have been graded. The Engineer and Geotechnical Engineer will provide final approval to the Contractor during site visit. Any additional cost required from multiple testing visits and trip will be the responsibility of the Contractor, not the Owner nor Engineer.

#### **1.06 PROJECT CONDITIONS**

- A. Protect above- and below-grade utilities that remain.
- B. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from grading equipment and vehicular traffic.
- C. The Contractor must determine for himself the volume of material required by the site.

#### **1.07 PRODUCT HANDLING**

- A. Comply with pertinent provisions of Section 01 60 00 - Product Requirements.

#### **1.08 JOB CONDITIONS**

- A. Notification of intent to excavate:
  - 1. South Carolina Underground Utility Damage Prevention Act (S.C. Code Ann, 58-35-10, 2012) requires persons to ascertain the location of underground public utility property prior to excavation or demolition in certain situations. The Act also requires such persons to give timely notice of intent to excavate or demolish prior to commencing such operations. Failure to comply could subject the violator to a civil penalty of up to one thousand dollars (\$1,000) for each violation of the Act.
  - 2. Notification of intent to excavate may be given by calling this toll free number: 1-800-922-0983.

### **PART 2 PRODUCTS**

#### **2.01 SOIL MATERIALS**

- A. General:
  - 1. Soil material used as fill, backfill, subgrade for structures or pavements, embankments, or site grading shall consist of suitable material as found available on site until such supply of on-site material is depleted.
    - a. Provide suitable material free from organic matter and deleterious substances, containing no rocks or lumps over 6" in greatest dimension, and with not more than 15% of the rocks or lumps larger than 2-1/2" in their greatest dimension.

- b. Do not permit rocks having a dimension greater than 1" in the upper 6" of fill or embankment.
    - 2. Should the quantity of suitable on-site material be insufficient to complete the work, suitable borrow material as approved by the Engineer shall be provided by the Contractor at no additional expense to the Owner.
    - 3. Select materials may be provided from on-site if acceptable material as approved by the Engineer is available on site. Otherwise approved select material shall be provided by the Contractor from an off-site source.
  - B. Topsoil:
    - 1. Use topsoil consisting of material removed from the top 3" to 6" of existing on-site soils.
    - 2. Use topsoil containing no stones, roots or large clods of soil.
    - 3. Stockpile topsoil separate from other excavated material.

## **2.02 WEED KILLER**

- A. Provide a dry, free-flowing, dust free chemical compound, soluble in water, capable of inhibiting growth of vegetation and approved for use on this work by governmental agencies having jurisdiction.

## **2.03 EQUIPMENT**

- A. Use equipment adequate in size, capacity and numbers to accomplish the work in a timely manner without undue waste or damage of material.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that survey bench mark and intended elevations for the Work are as indicated.
- B. Surface Conditions:
  - 1. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

### **3.02 PREPARATION**

- A. Identify required lines, levels, contours, and datum.
- B. Stake and flag locations of known utilities.
- C. Locate, identify, and protect utilities that remain, from damage.
- D. Notify utility company to remove and relocate utilities.
- E. Clearing and grubbing: Clear and grub areas to be graded prior to commencement of the

grading operations.

- F. Where so directed by the Owner, protect and leave standing designated desirable trees.
- G. Complete any demolition and/or removal work as may be required prior to grading operations.
- H. Dispose of all clearing, grubbing and demolition debris and other deleterious material off the project site. Vegetation, roots, brush, rubbish, stumps, etc. may be burned on-site where permitted by local authorities and regulations and approved by the Engineer.
- I. Topsoil: Strip topsoil to a depth of 3" to 6" without contamination from the subsoil and stockpile topsoil separate from other excavated materials.
  - 1. Transport and deposit topsoil in storage piles convenient to areas that are to receive topsoil or in other locations as indicated or approved by the Engineer.
  - 2. Deposit topsoil in areas that are already graded and will not be disturbed by on-going construction.
  - 3. Dispose of unsuitable or unusable stripped material off-site or as otherwise directed by the Engineer.
- J. Sampling and preliminary testing:
  - 1. Prior to beginning the grading operations, the Contractor shall submit to the Engineer his proposed sequence of excavation operations.
  - 2. Based upon the sequence of excavation, samples of the fill materials will be obtained as excavation proceeds and tested for grain size permeability and moisture density relationship using the Standard Proctor Method (ASTM D698, Method A).
  - 3. Allow sufficient time for completion of laboratory tests before any fill operations begin, using the soils being tested.

### **3.03 ROUGH GRADING**

- A. Remove topsoil from areas to be further excavated, re-landscaped, or re-graded, without mixing with foreign materials.
- B. Remove subsoil from areas to be further excavated, re-landscaped, or re-graded.
- C. Do not remove wet subsoil, unless it is subsequently processed to obtain optimum moisture content.
- D. When excavating through roots, perform work by hand and cut roots with sharp axe.
- E. Perform excavating of every type of material encountered within the limits of the Work to the lines, grades and elevations indicated and specified herein.
- F. Suitable excavated materials:
  - 1. Use all suitable materials removed from the excavation as far as practicable in the formation of the embankments, subgrades, shoulders, building sites and other places as directed.



2. Unless otherwise indicated on the drawings or approved by the Engineer, surplus suitable material shall be removed from the site and disposed of by the Contractor.
- G. Unsuitable excavated material: Remove from the site and dispose of all unsuitable material unless otherwise approved by the Engineer.
- H. Rock excavation:
1. Notify the Engineer upon encountering rock or similar material which cannot be removed or excavated by conventional earth moving or ripping equipment.
  2. Do not use explosives without written permission from the Engineer.
  3. When explosives are permitted, use only experienced powdermen or persons who are licensed or otherwise authorized to use explosives. Store, handle and use explosives in strict accordance with all regulatory bodies and the "Manual of Accident Prevention in Construction" of the Associated General Contractors of America, Inc.
  4. The Contractor shall be solely responsible for any damage resulting from the use of explosives.
  5. The Contractor is responsible for securing all permit required in performing this work.
- I. Unauthorized excavation:
1. Excavation of material to depths below the grades indicated unless so directed by the Engineer will be deemed unauthorized excavation.
  2. Unauthorized overexcavation shall be backfilled and compacted without any additional expense to the Owner.
- J. In the event that it is necessary to remove unsuitable material to a depth greater than that shown on the drawings or otherwise specified, the Contractor, upon receiving direction from the Engineer, shall remove, replace and compact such material as directed by the Engineer at no additional expense by the Owner.
- K. Filling and Backfilling
1. Use fills formed of suitable material placed in layers of not more than 8" in depth measured loose and rolled and/or vibrated with suitable equipment until compacted.
  2. Do not place rock that will not pass through a 6" diameter ring within the top 12" of the surface of the completed fill or rock that will not pass through a 3" diameter ring within the top 6" of the completed fill.
  3. Do not use broken concrete or asphaltic pavement in fills.
  4. Selection of borrow material:
    - a. Material in excess of that available on the site shall be suitable material furnished by the Contractor from private sources selected by the Contractor. The material shall be approved by the Engineer before use. All expenses

involved in securing, developing, transporting and placing the material shall be borne by the Contractor.

L. Placing and compacting:

1. Place backfill and fill materials in layers not more than 8" in loose depth.
2. Before compacting, moisten or aerate each layer as necessary to provide the optimum moisture content.
3. Compact each layer to required percentage of maximum density for the area.
4. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
5. Place backfill and fill materials evenly adjacent to structures, to required elevations.
6. Take care to prevent wedging action of backfill against structures by carrying the material uniformly around the structures to approximately the same elevation in each lift.

M. Moisture control:

1. Do not use soil material that is either too dry or too wet to achieve proper compaction.
2. Where subgrade or layer of soil material is too dry to achieve proper compaction, uniformly apply water to surface of soil material such that free water does not appear on the surface during or subsequent to compacting operations.
3. Remove and replace, or scarify and air dry, soil material that is too wet to permit compacting to the specified density.
4. Soil material that has been removed because it is too wet to permit compacting may be stockpiled or spread and allowed to dry. Assist drying by disking, harrowing, or pulverizing until moisture content is reduced to a satisfactory value as determined by moisture-density relation tests approved by the Engineer.

N. Compaction requirements:

1. Compact soils to not less than the following percentages of maximum dry density as determined in accordance with ASTM D698, Method A (Standard Proctor).
2. Fill beneath structures and beneath an area extending 10' beyond the limits of the foundation:
  - a. Top 12" of Subgrade 98%
  - b. All other fill material 95%
3. Beneath Roadways:
  - a. Top 12" of Subgrade 98%
  - b. All other fill material 95%

- 4. Embankments:
  - a. Top 12" of Subgrade 98%
  - b. All other fill material 95%
  
- O. Placing of Special Materials:
  - 1. Placing impervious liner materials:
    - a. Place selected fine grain soils on bottom and side slopes of the basin to the indicated depth.
    - b. Inspect and proofroll the stripped and grubbed subgrade prior to placement of any liner material, as specified hereinafter.
    - c. Spread liner material in 8" maximum, loose lift thickness to provide a 6" compacted lift thickness.
    - d. Adjust soil moisture content to 1 to 3 percentage points "wet" of the optimum moisture contents.
    - e. Compact at 98% of maximum density.
    - f. Maintain liner material sufficiently moist to prevent drying and cracking, until such time as the basin is filled.
  
- P. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

### **3.04 SOIL REMOVAL**

- A. Stockpile excavated topsoil on site.
- B. Stockpile subsoil to be re-used on site; remove remainder from site.
- C. Stockpiles: Use areas designated on site; pile depth not to exceed 8 feet (2.5 m); protect from erosion.

### **3.05 FINISH GRADING**

- A. General:
  - 1. Uniformly grade the areas within limits of grading under this Section, including adjacent transition areas.
  - 2. Smooth the finished surfaces within specified tolerance.
  - 3. Grade with uniform levels or slopes between points where elevations are shown on the drawings, or between such points and existing grades.
  - 4. Where a change of slope is indicated on the drawings, construct a rolled transition section having a minimum radius of approximately 8'0", unless adjacent construction will not permit such a transition, or if such a transition defeats positive control of drainage.

- B. Before Finish Grading:
  - 1. Verify subgrade has been contoured and compacted.
- C. Remove debris, roots, branches, stones, in excess of 1/2 inch (13 mm) in size. Remove soil contaminated with petroleum products.
- D. Grading adjacent to structures: Grade areas adjacent to buildings to achieve drainage away from the structures and to prevent ponding.
- E. Ditches and gutters and swales:
  - 1. Cut accurately to the cross sections, grades and elevations shown.
  - 2. Maintain excavations free from detrimental quantities of leaves, sticks, trash and other debris until completion of the work.
  - 3. Dispose of excavated materials as specified herein; do not in any case deposit materials within 3'0" of the edge of a ditch.
- F. Upon completion of site grading and other related site work, topsoil shall be uniformly spread over the graded or improved areas. Topsoil shall be evenly distributed to conform to final grade elevations shown on the plans.
- G. Where topsoil is to be placed, scarify surface to depth of 3 inches (75 mm).
- H. In areas where vehicles or equipment have compacted soil, scarify surface to depth of 3 inches (75 mm).
- I. Place topsoil in areas where grassing/seeding are indicated.
- J. Place topsoil to the following compacted thicknesses:
- K. Areas to be seeded with grass not less than: 3 inches (75 mm).
- L. Place topsoil during dry weather.
- M. Remove roots, weeds, rocks, and foreign material while spreading topsoil.
- N. Near plants spread topsoil manually to prevent damage.
- O. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contour of subgrade.
- P. Lightly compact placed topsoil.
- Q. Any surplus topsoil materials shall be disposed of in approved areas on the site.

### **3.06 TOLERANCES**

- A. Top Surface of Subgrade: Plus or minus 1/10 foot (30 mm) from required elevation.
- B. Top Surface of Finish Grade: Plus or minus 1/2 inch (13 mm).
- C. Construct areas outside of building or structure lines true to grades shown.

1. Where no grade is indicated, shape finish surface to drain away from buildings or structures, as approved by the Engineer.
- D. Degree of finish shall be that ordinarily obtainable from bladegrader, supplemented with hand raking and finishing.

### **3.07 FIELD QUALITY CONTROL**

- A. See Section 31 23 23.13 - Backfill and Compaction, for compact density testing and the following:
- B. Secure the Engineer's construction review and observation and approval of subgrades and fill layers before subsequent construction is permitted thereon.
- C. Field density determinations will be made, at no additional cost to the Owner, to ensure that the specified densities are being obtained. Field density tests will be performed as determined by the Engineer, considering the following:
  1. At areas to receive paving, at least one field density test for every 5,000 sq. ft. of subgrade area, but not less than three tests.
  2. In each compacted fill layer, one field density test for every 5,000 sq. ft. of overlying paved area, but not less than three tests.
  3. In fill beneath structures, one field density test for every 2,500 sq. ft. in each layer.
  4. Other tests as deemed necessary by the Engineer.
- D. If, in the Engineer's opinion based on reports of the testing laboratory, subgrade or fills which have been placed are below specified density, provide additional compacting and testing until specified requirements are met.
  1. Additional testing will be provided by the Owner-approved testing laboratory and all costs for the additional testing will be borne by the Contractor.
- E. Proofrolling:
  1. The Contractor shall proofroll subgrade of areas to receive paving, structures on fill or impervious lining material.
    - a. Make not less than 3 passes of a 25 to 50 ton rubber tired roller over the full area.
    - b. Unstable, soft or otherwise unsuitable materials revealed by the proofrolling shall be removed and replaced with satisfactory materials, compacted as specified herein.

### **3.08 CLEANING AND PROTECTION**

- A. Remove unused stockpiled topsoil and subsoil. Grade stockpile area to prevent standing water.
- B. Leave site clean and raked, ready to receive landscaping.

- C. Existing utilities:
  - 1. Unless shown to be removed, locate and protect active utility lines shown on the drawings or otherwise made known to the Contractor prior to excavating. If damaged, repair or replace at no additional cost to the Owner.
  - 2. If active utility lines are encountered and are not shown on the drawings or otherwise made known to the Contractor, promptly notify the Engineer and take necessary steps to assure that service is not interrupted.
  - 3. If 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 Owner.
  - 4. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the Engineer and secure his instructions.
  - 5. Do not proceed with permanent relocation of utilities until written instructions are received from the Engineer.
- D. Protection of persons and property:
  - 1. Barricade open holes and depressions occurring as part of this Work, and post warning lights on property adjacent to or with public access.
  - 2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
  - 3. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, washout and other hazards created by operations under this Section.
- E. Use means necessary to prevent dust becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site.
- F. Maintain access to adjacent areas at all times.
- G. Excavate and backfill in a manner and sequence that will provide proper drainage at all times.

### **3.09 MAINTENANCE**

- A. Protection of newly graded areas:
  - 1. Protect newly graded areas from traffic and erosion, and keep free from trash and weeds.
  - 2. Repair and re-establish grades in settled, eroded and rutted areas to the specified tolerances.
- B. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify the surface, reshape, and compact to the required density prior to further construction.

**3.10 MEASUREMENT AND PAYMENT**

- A. No separate measurement or direct payment will be made for the work under this Section and all costs for same shall be included in the lump sum bid price.

**END OF SECTION**

## SECTION 31 23 16

### EXCAVATION

#### PART 1 GENERAL

##### 1.01 WORK REQUIRED BY THIS SECTION

- A. Excavating for Utility Structures, Stormwater Lines

##### 1.02 RELATED SECTIONS

- A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, and Sections in Division 01 of these Specifications.
- B. Section 01 70 00 - Execution and Closeout Requirements: General requirements for dewatering of excavations and water control.
- C. Section 31 22 00 - Grading.
- D. Section 31 23 16.13 – Trenching for Site Utilities.
- E. Section 31 23 23.13 - Backfill and Compaction.
- F. Section 31 25 00 - Erosion and Sedimentation Control.
- G. Section 31 37 00 - Riprap.

##### 1.03 PROJECT CONDITIONS

- A. Verify that survey benchmarks and intended elevations for the Work are as indicated.
- B. Protect plants, lawns, rock outcroppings, and other features to remain.
- C. Protect benchmarks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

##### 1.04 CLASSIFICATION:

- A. Classification: All excavation is unclassified and excavation of every description, regardless of material encountered within the excavation limits of the structure, shall be performed to the lines and grades indicated.

##### 1.05 DEFINITIONS:

- A. Open areas: Open areas shall be those areas that do not include building sites, paved areas, street right-of-way and parking areas.
- B. Maximum density: Maximum weight in pounds per cubic foot of a specific material.
- C. Optimum moisture: Percentage of water in a specific material at maximum density.
- D. Rock excavation: Excavation of any hard natural substance which requires the use of explosives and/or special impact tools such as jack hammers, sledges, chisels or similar devices specifically designed for use in cutting or breaking rock, but exclusive of trench excavating machinery. To be considered as rock excavation, the material shall be continuous; individual boulders or rocks in soil will not be considered rock excavation.



- E. Muck: Materials unsuitable for foundation because of organic content, saturation to the extent that it is somewhat fluid and must be moved by dragline, dredge, or other special equipment, are designated as muck. No extra payment will be made for muck removal.
- F. Unsuitable material: Unsuitable material is defined as earth material unsatisfactory for its intended use and as classified by the soils technicians. In addition to organic matter, sod, muck, roots, and rubbish, highly plastic clay soils of the CH and MH descriptions, and organic soils of the OL and OH descriptions, as defined in the Unified Soil Classification System shall be considered as unsuitable material.
- G. Suitable material: Where the term suitable material is used in specification sections pertaining to earthwork, it means earth or materials designated as being suitable for their intended use by soils technicians or the Engineer. Suitable material shall be designated as meeting the requirements of the Unified Soil Classification System types SW, GW, GC, SC, SM, ML, CI or as designated in these specifications.
- H. Select material: Select material is defined as granular material to be used where indicated on the drawings or where specified herein consisting of soils conforming to the Unified Soil Classification types SW, SM, GW, or GM or as otherwise approved by the Engineer as select fill. Select material shall contain no stones or rubble larger than 1-1/2" in diameter.
- I. Crushed stone (gravel): Crushed stone shall be No. 57 aggregate or equal conforming to ASTM C 33.
- J. Excavation: Excavation is defined as unclassified excavation of every description regardless of materials encountered.

#### **1.06 QUALITY ASSURANCE**

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Comply with requirements of governmental agencies having jurisdiction
- C. Testing: A testing laboratory, approved by the Owner, will make such tests as are deemed advisable. Testing shall be as specified in Section 01 45 29, Testing Laboratory Services.
  - 1. Schedule fill and backfill operations so as to permit a reasonable time for inspection and testing before placing succeeding lifts and keep the laboratory and Engineer informed of progress.
  - 2. Notify the Engineer and allow sufficient time for observation and/or testing of foundation subgrades prior to commencing any work on the exposed excavation.

#### **1.07 JOB CONDITIONS**

- A. If conditions encountered during construction warrant additional removal of unsuitable material below foundation subgrades, then remove unsuitable material and replace it as specified at no additional expense to the Owner.

#### **1.08 PRODUCT HANDLING**

- A. Comply with pertinent provisions of Section 01 60 00.

## **PART 2 PRODUCTS – NOT USED**

### **PART 3 EXECUTION**

#### **3.01 PREPARATION**

- A. Identify required lines, levels, contours, and datum locations.
- B. See Section 31 22 00 - Grading, for additional requirements.
- C. Locate, identify, and protect utilities that remain and protect from damage.
- D. Notify utility company to remove and relocate utilities.

#### **3.02 EXCAVATING**

- A. Underpin adjacent structures that could be damaged by excavating work.
- B. Excavate to accommodate new structures and construction operations.
- C. Notify Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
- D. Preparation for Piling Work: Excavate to working elevations. Coordinate special requirements for piling.
- E. Slope banks of excavations deeper than 4 feet (1.2 meters) to angle of repose or less until shored.
- F. Do not interfere with 45 degree bearing splay of foundations.
- G. Cut utility trenches wide enough to allow inspection of installed utilities.
- H. Hand trim excavations. Remove loose matter.
- I. Remove lumped subsoil, boulders, and rock up to 1/3 cu yd (0.25 m<sup>3</sup>) measured by volume.
- J. Correct areas that are over-excavated and load-bearing surfaces that are disturbed; See Section 31 23 23.13.
- K. Conform to elevations and dimensions shown within a tolerance of 0.10', and extending a sufficient distance from footings and foundations to permit placing and removing concrete formwork, installation of services, other construction required and for construction observation.
- L. Where earth will stand, shallow footing excavations may be cut to the exact size of the footing.
- M. Grade top perimeter of excavation to prevent surface water from draining into excavation.
- N. Remove excavated material that is unsuitable for re-use from site.
- O. Stockpile excavated material to be re-used in area designated on site in accordance with Section 31 22 00 - Grading.

- P. Remove excess excavated material from site.

### **3.03 FOUNDATION SUBGRADES**

- A. Excavate foundations and footings to a level bottom in firm, solid, suitable material.
- B. Take care not to disturb the bottom of the excavation unless further compaction of the subgrade is required.
- C. Notify the Engineer in due time to permit observation of the completed excavation prior to performing work on the foundation subgrade.
- D. Should unsuitable or soft material be encountered at subgrade elevation, remove such material and replace with compacted suitable material or crushed stone from firm earth up to the indicated elevation.
  - 1. In wet excavations or where groundwater is normally present, replace unsuitable material with crushed stone or lean concrete.
  - 2. In dry excavations above the normal groundwater level, replace unsuitable material with compacted suitable material.
  - 3. Unsuitable material shall be removed and replaced at no expense to the Owner.
  - 4. Where rock is encountered at foundation level:
    - a. Use drilling, picking, wedging or similar methods leaving the foundation rock in an entirely solid and unshattered condition.
    - b. Roughen approximately level surfaces to provide satisfactory bond with concrete.
    - c. Cut steps or benches in sloped surfaces to provide satisfactory bond.

### **3.04 DRAINAGE**

- A. Provide drainage and control grading in the vicinity of the work to prevent drainage into the excavation.

### **3.05 ROCK EXCAVATION**

- A. Notify the Engineer upon encountering rock or similar material that cannot be removed or excavated by conventional earth moving or ripping equipment.
- B. Do not use explosives without written permission from the Engineer.
- C. When explosives are permitted, use only experienced powdermen or persons who are licensed or otherwise authorized to use explosives. Store, handle and use explosives in strict accordance with all regulatory bodies and the "Manual of Accident Prevention in Construction" of the Associated General Contractors of America, Inc.
- D. The Contractor shall be solely responsible for any damage resulting from the use of explosives.
- E. The Contractor is responsible for securing all permits required in performing this work.

- F. Do not use blasting adjacent to existing buildings or structures. Remove rock at such locations using jack hammers and bull points.

### **3.06 UNAUTHORIZED EXCAVATION**

- A. Excavation of material to depths below the grades indicated unless so directed by the Engineer will be deemed unauthorized excavation.
- B. Backfill and compact unauthorized over excavation at no expense to the Owner.
  - 1. In wet excavations or excavations below normal groundwater elevations: Use crushed stone or lean concrete as directed by the Engineer.
  - 2. In dry excavations above normal groundwater elevations: Use compacted suitable material.

### **3.07 DEWATERING**

- A. Remove all surface and subsurface waters from excavations and maintain the excavation in a dry condition during construction operations.
- B. Maintain the water level below the excavation subgrade during excavation and construction.
  - 1. Material disturbed below the foundation subgrade due to improper dewatering shall be removed and replaced with crushed stone or lean concrete at no expense to the Owner.
  - 2. Use sumps, pumps, drains, trenching or well point system as necessary to maintain a dry excavation.
  - 3. Dewatering by trench pumping will not be permitted if migration of fine grained natural material (running sand) from bottom, side walls or bedding material will occur.
- C. Dispose of water pumped from excavations in storm drains having capacity, canals, trenches or other approved locations.
  - 1. Contractor is responsible for acquiring all permits required to discharge the water and shall protect waterways from turbidity during the operation.
  - 2. Prevent flooding of streets, roadways, or private property.
  - 3. Provide engines driving dewatering pumps with residential type mufflers.

### **3.08 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection and testing.
- B. Provide for visual inspection of load-bearing excavated surfaces before placement of foundations.

### **3.09 PROTECTION**

- A. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.

- B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.
- C. Protect structures, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, washout and other hazards created by operations under this Section.
- D. Unless shown to be removed, locate and protect active utility lines shown on the drawings or otherwise made known to the Contractor prior to excavating. If damaged, repair or replace at no additional cost to the Owner.
- E. If active utility lines are encountered and are not shown on the drawings or otherwise made known to the Contractor, promptly notify the Engineer and take necessary steps to assure that service is not interrupted.
- F. Barricade open holes and depressions occurring as part of this work, and post warning lights on property adjacent to or with public access. Operating warning lights during hours from dusk to dawn each day and as otherwise required.
- G. Side slopes: Slope, bench and/or shore sides of excavations and trench walls to maintain stability of the wall or sides. Pile materials obtained from the excavation a minimum of four feet from the edge of the excavation.
- H. Shoring and sheeting: Where necessary, shore and sheet excavations with members of sizes and arrangement sufficient to prevent injury to persons, damage to structures or injurious caving or erosion.
  - 1. Furnish, put in place, and maintain such sheeting and bracing as may be required to support the sides of excavations, to prevent any movement which could in any way diminish the width of the excavation below that necessary for proper construction, and to protect adjacent structures from undermining or other damage. Any movement or bulging that may occur shall be corrected immediately by the Contractor. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed, they shall be immediately filled and compacted.
  - 2. Take all precautions to prevent distress of existing structures because of sheeting installation or removal. Where the removal of sheeting may cause damage to existing or newly constructed structures, such sheeting shall be left in place at no expense to the Owner.
  - 3. All sheeting and shoring operations and maintenance thereof shall be the responsibility of the Contractor.

### **3.10 MEASUREMENT AND PAYMENT**

- A. No separate measurement or direct payment will be made for the work under this Section and all costs for same shall be included in the lump sum bid.

**END OF SECTION**

## SECTION 31 23 16.13

### TRENCHING FOR SITE UTILITIES

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Backfilling and compacting for underground utilities.

##### 1.02 RELATED REQUIREMENTS

- A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Sections in Division 1 of these Specifications.
- B. Section 01 71 23 - Field Engineering.
- C. Section 31 22 00 - Grading.
- D. Section 31 23 16 - Excavation.
- E. Section 31 23 23.13 – Backfill and Compaction.
- F. Section 33 41 00 - Storm Drainage Piping.

##### 1.03 DEFINITIONS

- A. Subgrade Elevations: Indicated on drawings.

##### 1.04 REFERENCES

- A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; American Association of State Highway and Transportation Officials; 2010 (2009).
- B. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2006.
- C. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)); 2012.
- D. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2007.
- E. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN m/m<sup>3</sup>)); 2012.
- F. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2008.
- G. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2011.
- H. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth); 2005.

- I. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 2005.
- J. ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils; 2010.
- K. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth); 2010

#### **1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Samples: 10 lb sample of each type of fill; submit in air-tight containers to testing laboratory.
- C. Materials Sources: Submit name of imported materials source.
- D. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used.
- E. Compaction Density Test Reports.

#### **1.06 DELIVERY, STORAGE AND HANDLING**

- A. When necessary, store materials on site in advance of need.
- B. When fill materials need to be stored on site, locate stockpiles where indicated.
  - 1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
  - 2. Prevent contamination.
  - 3. Protect stockpiles from erosion and deterioration of materials.
- C. Verify that survey bench marks and intended elevations for the Work are as indicated.
- D. Protect plants, lawns, rock outcroppings and other features to remain.
- E. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

#### **1.07 QUALITY ASSURANCE**

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Use equipment adequate in size, capacity, and numbers to accomplish the work in a timely manner.

#### **1.08 JOB CONDITIONS**

- A. Existing utilities:

1. Approximate location of certain underground lines and structures are shown on the plans for information only, other underground lines or structures are not shown.
2. Locate these and other possible unknown utility lines using electronic pipe finder, or other approved means.
3. Locate, excavate and expose all existing underground lines in advance of trenching operations.
4. The Contractor will be held responsible for the workmanlike repair of any damage done to any of these utilities in the execution of his work under this Section.
5. The Contractor shall familiarize himself with the existing conditions and be prepared to adequately care for and safeguard himself and the Owner from damage.

B. Notification of intent to excavate:

1. South Carolina Underground Utility Damage Prevention Act (S.C. Code Ann, 58-35-10, CT-SEQ, Supp. 1978) requires persons to ascertain the location of underground public utility property prior to excavation or demolition in certain situations. The Act also requires such persons to give timely notice of intent to excavate or demolish prior to commencing such operations. Failure to comply could subject the violator to a civil penalty of up to one thousand dollars (\$1,000) for each violation of the Act.
  - a. Notification of intent to excavate may be given by calling this toll free number: 811.

C. Protecting trees, shrubbery and lawns:

1. Trees and shrubbery in developed areas and along the trench line shall not be disturbed unless absolutely necessary, and subject to the approval of the Engineer.
  - a. Any such trees and shrubbery necessary to be removed shall be heeled in and replanted.
2. Where trenches cross private property through established lawns, sod shall be cut, removed, stacked and maintained in suitable condition until replacement is approved by the Engineer.
  - a. Topsoil underlying lawn areas shall be removed and kept separate from general excavated materials.

D. Clearing:

1. Perform all clearing necessary for installation of the complete work.
2. Clearing shall consist of removing all trees, stumps, roots, brush and debris in the rights-of-way obtained for the Work.
3. All timber of merchantable size shall remain the property of the Owner and shall be trimmed and cut in such lengths as directed and stacked along the edge of the right-of-way.



4. All other material, including trimmings from above, shall be completely disposed of in a satisfactory manner.
- E. Removing and resetting fences:
1. Where existing fences must be removed to permit construction of utilities:
    - a. Remove such fences and, as the Work progresses, reset the fences in their original location and condition.
    - b. Provide temporary fencing or other safeguards as required to prevent stock and cattle from wandering to other lands.
- F. Restoration of disturbed areas:
1. Restore all areas disturbed by, during or as a result of construction activities to their existing or better condition.
  2. Do not interpret this as requiring replacement of trees and undergrowth in undeveloped sections of the rights-of-way.
- G. Minimizing silting and bank erosion during construction:
1. During construction, protective measures shall be taken and maintained to minimize silting and bank erosion of creeks and rivers adjacent to the work being performed during construction.

## **PART 2 PRODUCTS**

### **2.01 FILL MATERIALS**

- A. General Fill: Subsoil excavated on-site.
1. Graded.
  2. Free of lumps larger than three (3) inches, rocks larger than two (2) inches, and debris.
  3. Conforming to ASTM D 2487 Group Symbol CL.
- B. Granular Fill - Fill Type No. 57: Coarse aggregate, conforming to State of South Carolina Highway Department standard.
- C. Granular Fill - Gravel: Pit run washed stone; free of shale, clay, friable material and debris.
1. Graded in accordance with ASTM D 2487 Group Symbol GW.
  2. Graded in accordance with ASTM C 136, within the following limits:
    - a. 2 inch sieve: 100 percent passing.
    - b. 1 inch sieve: 95 percent passing.
    - c. 3/4 inch sieve: 95 to 100 percent passing.

- d. 5/8 inch sieve: 75 to 100 percent passing.
  - e. 3/8 inch sieve: 55 to 85 percent passing.
  - f. No. 4 sieve: 35 to 60 percent passing.
  - g. No. 16 sieve: 15 to 35 percent passing.
  - h. No. 40: 10 to 25 percent passing.
  - i. No. 200: 5 to 10 percent passing.
- D. Granular Fill - Pea Gravel: Natural stone; washed, free of clay, shale, organic matter.
- 1. Grade in accordance with ASTM D 2487 Group Symbol GM.
  - 2. Graded in accordance with ASTM C 136, within the following limits:
    - a. Minimum Size: 1/4 inch.
    - b. Maximum Size: 5/8 inch.
- E. Sand: Natural river or bank sand; washed; free of silt, clay, loam, friable or soluble materials, and organic matter.
- 1. Grade in accordance with ASTM D 2487 Group Symbol SW.
  - 2. Graded in accordance with ASTM C 136; within the following limits:
    - a. No. 4 sieve: 100 percent passing.
    - b. No. 14 sieve: 10 to 100 percent passing.
    - c. No. 50 sieve: 5 to 90 percent passing.
    - d. No. 100 sieve: 4 to 30 percent passing.
    - e. No. 200 sieve: 0 percent passing.
- F. Topsoil: Topsoil excavated on-site.
- 1. Select.
  - 2. Graded.
  - 3. Free of roots, rocks larger than 1/2 inch, subsoil, debris, large weeds and foreign matter.
  - 4. Acidity range (pH) of 5.5 to 7.5.
  - 5. Containing a minimum of 4 percent and a maximum of 25 percent inorganic matter.
  - 6. Conforming to ASTM D2487 Group Symbol OH.

## **2.02 EXCAVATED MATERIALS**

- A. Perform all excavation of every description and of whatever substances encountered to depths indicated or specified.
- B. Pile material suitable for backfilling in an orderly manner at safe distance from banks or trenches to avoid overloading and to prevent slides or cave-ins.
- C. Remove and deposit unsuitable or excess materials as directed by the Engineer.

## **2.03 BACKFILL MATERIALS**

- A. Provide from materials excavated for installation of utility.
  - 1. Select soil material free from organic matter and deleterious substances, containing no rocks or lumps over 2-inches in greatest dimension for backfill up to 12-inches above top of utility being covered.
  - 2. Do not permit rocks larger than 2-inches in greatest dimension in top 6-inches of backfill.

## **2.04 OTHER MATERIALS**

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.
- B. Should the quantity of suitable on-site material be insufficient to complete the work, provide suitable borrow material as approved by the Engineer at no additional expense to the Owner.
- C. Provide select materials from on-site if acceptable material as approved by the Engineer is available on-site. Otherwise, provide approved select material from an off-site source.

## **2.05 SOURCE QUALITY CONTROL**

- A. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.
- B. If tests indicate materials do not meet specified requirements, change material and retest.
- C. Provide materials of each type from same source throughout the Work.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that survey bench marks and intended elevations for the work are as indicated.

### **3.02 PREPARATION**

- A. Identify required lines, levels, contours, and datum locations.
- B. See Section 31 22 00 for additional requirements.
- C. Locate, identify, and protect utilities that remain and protect from damage.

- D. Notify utility company to remove and relocate utilities.
- E. Protect benchmarks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- F. Protect plants, lawns, rock outcroppings, and other features to remain.

### **3.03 PROTECTION OF EXISTING UTILITIES AND ADJACENT STRUCTURES**

- A. Existing utilities:
  - 1. Unless shown to be removed, protect active utility lines shown on the drawings or otherwise made known to the Contractor prior to trenching. If damaged, repair or replace at no additional cost to the Owner.
  - 2. 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.
  - 3. If 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 Owner.
  - 4. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the Engineer and secure his instructions.
  - 5. Do not proceed with permanent relocation of utilities until written instructions are received from the Engineer.
  - 6. Locations within streets or highways:
    - a. Comply with the South Carolina Department of Transportation's (SCDOT) "Encroachment Permit" issued for the Work and SCDOT's "A Policy for Accommodating Utilities on Highway Rights-of-Way".
    - b. Take all precautions and comply with all requirements as may be necessary to protect the improvements, including barricades for protection of traffic.
    - c. Keep minimum of one lane open to traffic at all times where utility crosses street or highway.
  - 7. 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 with public access.
    - b. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
    - c. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, washout and other hazards created by operations under this Section.

8. Dewatering:
  - a. Remove all water, including rain water, encountered during trench and sub-structure work to an approved location by pumps, drains, and other approved methods.
  - b. Keep trenches and site construction area free from water.
9. Use means necessary to prevent dust becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site.
10. Maintain access to adjacent areas at all times.

### **3.04 TRENCHING**

- A. Notify Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
- B. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.
- C. Do not interfere with 45 degree bearing splay of foundations.
- D. Cut trenches wide enough to allow inspection of installed utilities.
- E. Hand trim excavations. Remove loose matter.
- F. Remove large stones and other hard matter that could damage piping or impede consistent backfilling or compaction.
- G. Remove lumped subsoil, boulders, and rock up to 1/3 cu yd measured by volume.
- H. Remove excavated material that is unsuitable for re-use from site.
- I. Stockpile excavated material to be re-used in area designated on site in accordance with Section 31 22 00.
- J. Remove excess excavated material from site.
- K. Trench Excavation:
  1. Remove all materials of whatever substance encountered.
- L. Where trenching occurs in existing lawns, remove turf in sections and keep damp. Replace turf upon completion of the backfilling.
- M. Open cut:
  1. Excavate for utilities by open cut.
  2. If conditions at the site prevent such open cut, and if approved by the Engineer, tunneling may be used.
  3. Short sections of a trench may be tunneled if, in the opinion of the Engineer, the conductor can be installed safely and backfill can be compacted properly into such tunnel.

4. Remove boulders and other interfering objects, and backfill voids left by such removals, at no additional cost to the Owner.
  5. Remove wet or otherwise unstable soil incapable of properly supporting the utility, as determined by the Engineer, to depth required and backfill to proper grade with stone bedding material, at no additional cost to the Owner.
  6. Excavating for appurtenances:
    - a. Excavate for manholes and similar structures to a distance sufficient to leave at least 12-inches clear between outer surfaces and the embankment or shoring that may be used to hold and protect the banks.
    - b. Over depth excavation beyond such appurtenances that has not been directed will be considered unauthorized. Fill with sand, gravel, or lean concrete as directed by the Engineer, and at no additional cost to the Owner.
- N. Trench to the minimum width necessary for proper installation of the utility, with sides as nearly vertical as possible. Accurately grade the bottom to provide uniform bearing for the utility.
1. Dig to a true grade and to provide a smooth continuous support along the entire length of the pipeline.
  2. Excavate to a width not less than 12" greater than the outside diameter of the pipe.
  3. Trench depth shall provide a minimum of 4' of cover over the pipe as measured along the pipe centerline.
  4. Where the pipeline crosses creeks, drainage ditches or land subject to flooding, the depth of cover shall be 4' minimum.
  5. Where the pipeline crosses existing gas mains or other utilities, a minimum of 24" of separation under the existing utility shall be maintained. Additional depth of excavation as required to maintain separation shall be completed at no additional cost to the Owner.
  6. At any creek, draw, gully, embankment or other place where rough terrain exists, the trench shall be graded to avoid the use of bends or deflections greater than 2-1/2° per joint unless otherwise approved by the Engineer.
    - a. Where changes in direction occur requiring greater than 2-1/2° deflection, field bending of the pipe is to be used with minimum bending radius being no less than 10 times the pipe diameter.
- O. Provide sheeting and shoring necessary for protection of the Work and for the safety of personnel.
1. Remove in units when level of backfilling has reached the elevation necessary to protect the utility work and adjacent property.
  2. Shoring at the bottom of trenches over 10-feet deep for sewers 15-inches and larger in size, shall remain in place and be cut off no less than 2-inches above top of pipe, at no additional cost to the Owner.

3. When, in the opinion of the Engineer, other sheeting cannot be safely removed, it shall be left in place and the Contractor will be paid for such sheeting at the prices bid.
  - a. Cut such sheeting off at least 2-feet below finished surface.
  - b. No lumber for sheeting or shoring exceeding that size customarily used will be paid for unless the use of larger sizes has been ordered, in writing, by the Engineer.
- P. Depressions:
  1. Dig bell holes and depressions for joints after the trench has been graded. Provide uniform bearing for the pipe on prepared bottom of the trench.
  2. Except where rock is encountered, do not excavate below the depth indicated or specified.
  3. Where rock is encountered, excavate rock to a minimum over depth of 4-inches below the trench depth indicated or specified, and to provide 6-inches clearance in any horizontal direction from all parts of the utility and appurtenances.
- Q. Comply with pertinent OSHA regulations in regard to the excavation of utilities.

### **3.05 PREPARATION FOR UTILITY PLACEMENT**

- A. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.
- B. Compact subgrade to density equal to or greater than requirements for subsequent fill material.
- C. Until ready to backfill, maintain excavations and prevent loose soil from falling into excavation.

### **3.06 BACKFILLING**

- A. Backfill to contours and elevations indicated using unfrozen materials.
- B. Backfill trenches and excavations immediately after the pipes are laid, unless other protection is directed or indicated.
- C. Select and deposit backfill materials with special reference to the future safety of the pipes.
- D. Reopen trenches which 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 Engineer.
- E. Surplus material shall be disposed of as directed by the Engineer.
- F. Original surface shall be restored to the approval of the Engineer.
- G. Fill up to subgrade elevations unless otherwise indicated.
- H. Lower portion of trench:

1. Deposit approved backfill and bedding material in layers of 6-inches maximum thickness, and compact with suitable tampers to the density of the adjacent soil until there is a cover of not less than 36-inches over sewers and 12-inches over other utility lines.
  2. Take special care in backfilling and bedding operations not to damage pipe and pipe coatings.
- I. Remainder of trench:
1. Except for special materials for pavements, backfill the remainder of the trench with material free from stones larger than 6-inches or 1/2 the layered thickness, whichever is smaller, in any dimension.
  2. Deposit backfill material in layers not exceeding the thickness specified, and compact each layer to the minimum density directed by the soil engineer.
- J. Undeveloped areas:
1. Backfill in wooded, swampy or undeveloped areas shall be as specified hereinbefore, except that tamping of the backfill above a level 2-feet over the top of the pipe will not be required.
  2. Mound excavated material neatly over the ditch to provide for future settlements.
- K. Employ a placement method that does not disturb or damage other work.
- L. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.
- M. Maintain optimum moisture content of fill materials to attain required compaction density.
- N. Granular Fill: Place and compact materials in equal continuous layers not exceeding 6 inches compacted depth.
- O. Soil Fill: Place and compact material in equal continuous layers not exceeding 8 inches compacted depth.
- P. Slope grade away from building minimum 2 inches in 10 ft, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.
- Q. Correct areas that are over-excavated.
1. Thrust bearing surfaces: Fill with concrete.
  2. Other areas: Use general fill, flush to required elevation, compacted to minimum 95 percent of maximum dry density.
- R. Compaction Density Unless Otherwise Specified or Indicated:
1. Under paving, slabs-on-grade, and similar construction: 100 percent of maximum dry density.
  2. At other locations: 95 percent of maximum dry density.



- S. Reshape and re-compact fills subjected to vehicular traffic.

### **3.07 BEDDING AND FILL AT SPECIFIC LOCATIONS**

- A. Use general fill unless otherwise specified or indicated.
- B. Utility Piping:
  - 1. Bedding: Use general fill.
  - 2. Cover with general fill.
  - 3. Fill up to subgrade elevation.
  - 4. Compact in maximum 8 inch lifts to 95 percent of maximum dry density.
- C. At Pipe Culverts:
  - 1. Bedding: Use general fill.
  - 2. Cover with general fill.
  - 3. Fill up to subgrade elevation.
  - 4. Compact in maximum 8 inch lifts to 95-percent of maximum dry density.

### **3.08 TOLERANCES**

- A. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

### **3.09 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection and testing.
- B. Perform compaction density testing on compacted fill in accordance with ASTM D1556, ASTM D2167, ASTM D3017, or ASTM D6938.
- C. Perform compaction density testing on compacted fill in accordance with ASTM D1556, ASTM D2167, ASTM D2922, or ASTM D3017.
- D. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D698 ("standard Proctor"), ASTM D1557 ("modified Proctor"), or AASHTO T 180.
- E. If tests indicate work does not meet specified requirements, remove work, replace and retest.
- F. Frequency of Tests:
  - 1. At least one (1) field density test for every fifty (50) linear feet of trench within each lift.

### **3.10 CLEANING**

- A. Leave unused materials in a neat, compact stockpile.

- B. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.
- C. Leave borrow areas in a clean and neat condition. Grade to prevent standing surface water.

**END OF SECTION**

## SECTION 31 23 23.13

### BACKFILL AND COMPACTION

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Filling, backfilling, and compacting for structure volume below grade.
- B. Backfilling and compacting for utilities outside the structure to utility main connections.
- C. Filling holes, pits, and excavations generated as a result of removal (demolition) operations.

##### 1.02 RELATED SECTIONS

- A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Sections in Division 01 of these Specifications.
- B. Geotechnical Data – Geotechnical Exploration Reports
- C. Section 03 30 00 - Cast-in-Place Concrete.
- D. Section 31 22 00 – Grading.
- E. Section 31 23 16.13 – Trenching for Site Utilities.
- F. Section 31 25 00 - Erosion and Sedimentation Control.

##### 1.03 REFERENCES

- A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; American Association of State Highway and Transportation Officials; 2001 (2004).
- B. ASTM C 136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2006.
- C. ASTM D 698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)); 2000a.
- D. ASTM D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2000.
- E. ASTM D 1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN m/m<sup>3</sup>)); 2002
- F. ASTM D 2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 1994(R 2001).
- G. ASTM D 2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2006.
- H. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth); 2005.

- I. ASTM D 3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 2005.
- J. ASTM D 4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils; 2005.

#### 1.04 DEFINITIONS

- A. Finish Grade Elevations: Indicated on drawings.
- B. Subgrade Elevations: Indicated on drawings.
- C. Open areas: Open areas shall be those areas that do not include building sites, paved areas, street right-of-way and parking areas.
- D. Maximum density: Maximum weight in pounds per cubic foot of a specific material.
- E. Optimum moisture: Percentage of water in a specific material at maximum density.
- F. Muck: Materials unsuitable for foundation because of organic content, saturation to the extent that it is somewhat fluid and must be moved by dragline, dredge, or other special equipment, are designated as muck. No extra payment will be made for muck removal.
- G. Unsuitable material: Unsuitable material is defined as earth material unsatisfactory for its intended use and as classified by the soils technicians. In addition to organic matter, sod, muck, roots, and rubbish, highly plastic clay soils of the CH and MH descriptions, and organic soils of the OL and OH descriptions, as defined in the Unified Soil Classification System shall be considered as unsuitable material.
- H. Suitable material: Where the term suitable material is used in specification sections pertaining to earthwork, it means earth or materials designated as being suitable for their intended use by soils technicians or the Engineer. Suitable material shall be designated as meeting the requirements of the Unified Soil Classification System types SW, GW, GC, SC, SM, ML, CI or as designated in these specifications.
- I. Select material: Select material is defined as granular material to be used where indicated on the drawings or where specified herein consisting of soils conforming to the Unified Soil Classification types SW, SM, GW, or GM or as otherwise approved by the Engineer as select fill. Select material shall contain no stones or rubble larger than 1-1/2" in diameter.
- J. Crushed stone (gravel): Crushed stone shall be No. 57 aggregate or equal conforming to ASTM C 33.

#### 1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Samples: 10 lb (4.5 kg) sample of each type of fill; submit in air-tight containers to testing laboratory.
- C. Materials Sources: Submit name of imported materials source.
- D. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used.
- E. Compaction Density Test Reports.

## 1.06 PROJECT CONDITIONS

- A. Provide sufficient quantities of fill to meet project schedule and requirements. When necessary, store materials on site in advance of need.
- B. When fill materials need to be stored on site, locate stockpiles where indicated.
  - 1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
  - 2. Prevent contamination.
  - 3. Protect stockpiles from erosion and deterioration of materials.
- C. Verify that survey benchmarks and intended elevations for the Work are as indicated.

## 1.07 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Comply with requirements of governmental agencies having jurisdiction.
- C. Testing: A testing laboratory, approved by the Owner, will make such tests as are deemed advisable. Testing shall be as specified in Section 01 45 29, Testing Laboratory Services.
  - 1. Schedule fill and backfill operations so as to permit a reasonable time for inspection and testing before placing succeeding lifts and keep the laboratory and Engineer informed of progress.
  - 2. Notify the Engineer and allow sufficient time for observation and/or testing of foundation subgrades prior to commencing any work on the exposed excavation.

## 1.08 JOB CONDITIONS

- A. Comply with pertinent provisions of Section 01 60 00 – Product Requirements.

## PART 2 PRODUCTS

### 2.01 SOIL MATERIAL GENERAL

- A. Soil material used as fill, backfill or subgrade for structures shall consist of suitable material.
  - 1. Provide suitable material free from organic matter and deleterious substances, containing no rocks or lumps over 6" in greatest dimension, and with not more than 15% of the rocks or lumps larger than 2-1/2" in their greatest dimension.
  - 2. Do not permit rocks having a dimension greater than 1" in the upper 6" of fill or subgrade.
- B. Where select material is indicated on the drawings or specified, use select granular material as defined herein and approved by the Engineer.

- C. Where indicated on the drawings or specified, use gravel or crushed stone as defined herein.
- D. Where indicated on the drawings or otherwise where desired, provide a lean concrete "mud slab" beneath foundations.
- E.
  - 1. Use 2000 psi concrete and a minimum thickness of 2-1/2".
  - 2. With prior approval of the Engineer, a "mud slab" may be substituted for gravel base material except where the gravel base is required for drainage or for use with pressure relief valves.

## **2.02 FILL MATERIALS**

- A. General Fill: Subsoil excavated on-site.
  - 1. Graded.
  - 2. Free of lumps larger than 3 inches (75 mm), rocks larger than 2 inches (50 mm), and debris.
  - 3. Conforming to ASTM D 2487 Group Symbol CL.
- B. Granular Fill- Fill Type #57: Coarse aggregate, conforming to State of South Carolina Highway Department standard.

## **2.03 SOURCE QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for general requirements for testing and analysis of soil material.
- B. If tests indicate materials do not meet specified requirements, change material and retest.
- C. Provide materials of each type from same source throughout the Work.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Identify required lines, levels, contours, and datum locations.

### **3.02 PREPARATION**

- A. Scarify subgrade surface to a depth of 6 inches (150 mm) to identify soft spots.
- B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.
- C. Compact subgrade to density equal to or greater than requirements for subsequent fill material.
- D. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

### **3.03 FILLING AND BACKFILLING**

- A. Fill to contours and elevations indicated using unfrozen materials.

- B. Employ a placement method that does not disturb or damage other work.
- C. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.
- D. Maintain optimum moisture content of fill materials to attain required compaction density.
- E. Slope grade away from building minimum 2 inches in 10 ft (50 mm in 3 m), unless noted otherwise. Make gradual grade changes. Blend slope into level areas.
- F. Correct areas that are over-excavated.
  - 1. Other areas: Use general fill, flush to required elevation, compacted to minimum 97 percent of maximum dry density.
- G. Compaction Density Unless Otherwise Specified or Indicated.
- H. Reshape and re-compact fills subjected to vehicular traffic.
- I. Use suitable material for all filling and backfilling operations.
- J. Fill under structures: Deposit suitable material in layers not exceeding 8" in depth and compact each layer using proper equipment.
- K.
  - 1. Do not place rock that will not pass through a 6" diameter ring within the top 12" of the surface of the completed fill or rock that will not pass through a 3" diameter ring within the top 6" of the completed fill.
  - 2. Do not place broken concrete, bricks, or asphaltic pavement in fills.
  - 3. Where indicated on the drawings, provide select granular material.
- L. Backfill excavations as promptly as progress of the Work permits, but not until completion of the following:
  - 1. Inspection and acceptance of construction below finish grade including, where applicable, damp proofing and waterproofing.
  - 2. Inspecting, testing, approving and recording locations of underground utilities.
  - 3. Removing concrete formwork.
  - 4. Removing shoring and bracing, and backfilling of voids with satisfactory materials.
  - 5. Removing trash and debris.
  - 6. Foundation walls have been in place seven days.
- M. Placing and compacting:
  - 1. Place backfill and fill materials in layers not more than 8" in loose depth.
  - 2. Before compacting, moisten or aerate each layer as necessary to provide the optimum moisture content within  $\pm 2\%$ .
  - 3. Compact each layer to required percentage of maximum density for area.

BACKFILL AND COMPACTION

31 23 23.13-5

4. Do not place backfill or fill material on surfaces that are muddy, frozen, or containing frost or ice.
5. Place backfill and fill materials evenly adjacent to structures, to required elevations.
6. Take care to prevent wedging action of backfill against structures by carrying the material uniformly around the structure to approximately the same elevation in each lift.
7. Do not operate heavy equipment closer to foundation or retaining walls than a distance equal to height of backfill above the footing.
  - a. Compact remaining area using power driven hand tampers.
8. Where the construction includes basement or other underground walls having structural floors over them, do not backfill such walls until the structural floors are in place and have attained sufficient strength to support the walls.

### **3.04 FILL AT SPECIFIC LOCATIONS**

#### **A. Over Buried Utility Piping, Conduits, and Duct Bank in Trenches:**

1. Bedding: Use general fill.
2. Cover with general fill.
3. Fill up to subgrade elevation.
4. Compact in maximum 8 inch (200 mm) lifts to 95 percent of maximum dry density.

#### **B. At Lawn Areas:**

1. Use general fill.
2. Fill up to 6 inches (150 mm) below finish grade elevations.
3. Fill up to subgrade elevations.
4. Compact to 95 percent of maximum dry density.
5. See Section 31 22 00 for topsoil placement.

### **3.05 COMPACTION REQUIREMENTS**

- A. Compact soils to not less than the following percentages of maximum dry density as determined in accordance with ASTM D698, Method A (Standard Proctor).
- B. Existing in place subgrade below structures where subgrade has been disturbed by water, improper dewatering, or construction traffic.
  1. Top 12" of subgrade: 98%
  2. Below top 12" of subgrade: 95%



- C. Fill beneath structures and beneath an area extending 10 feet beyond the limits of the foundation:
  - 1. Top 12" of subgrade: 98%
  - 2. Below top 12" of subgrade: 95%
- D. Compaction of suitable material used to replace unsuitable material below foundation subgrades:
  - 1. Top 12" of subgrade: 98%
  - 2. Below top 12" of subgrade: 95%

### **3.06 BACKFILLING, FILLING AND COMPACTION**

- A. Use suitable material for all filling and backfilling operations.
- B. Fill under structures: Deposit suitable material in layers not exceeding 8" in depth and compact each layer using proper equipment.
  - 1. Do not place rock that will not pass through a 6" diameter ring within the top 12" of the surface of the completed fill or rock that will not pass through a 3" diameter ring within the top 6" of the completed fill.
  - 2. Do not place broken concrete, bricks, or asphaltic pavement in fills.
  - 3. Where indicated on the drawings, provide select granular material.
- C. Backfill excavations as promptly as progress of the Work permits, but not until completion of the following:
  - 1. Inspection and acceptance of construction below finish grade including, where applicable, damp proofing and waterproofing.
  - 2. Inspecting, testing, approving and recording locations of underground utilities.
  - 3. Removing concrete formwork.
  - 4. Removing shoring and bracing, and backfilling of voids with satisfactory materials.
  - 5. Removing trash and debris.
  - 6. Foundation walls have been in place seven days.
- D. Placing and compacting:
  - 1. Place backfill and fill materials in layers not more than 8" in loose depth.
  - 2. Before compacting, moisten or aerate each layer as necessary to provide the optimum moisture content within  $\pm 2\%$ .
  - 3. Compact each layer to required percentage of maximum density for area.

4. Do not place backfill or fill material on surfaces that are muddy, frozen, or containing frost or ice.
5. Place backfill and fill materials evenly adjacent to structures, to required elevations.
6. Take care to prevent wedging action of backfill against structures by carrying the material uniformly around the structure to approximately the same elevation in each lift.
7. Do not operate heavy equipment closer to foundation or retaining walls than a distance equal to height of backfill above the footing.
  - a. Compact remaining area using power driven hand tampers.
8. Where the construction includes basement or other underground walls having structural floors over them, do not backfill such walls until the structural floors are in place and have attained sufficient strength to support the walls.

### **3.07 TOLERANCES**

- A. Top Surface of General Backfilling: Plus or minus 1 inch (25 mm) from required elevations

### **3.08 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection and testing.
- B. Secure the Engineer's construction observation and approval of subgrades and fill layers before subsequent construction is permitted thereon.
- C. Perform compaction density testing on compacted fill in accordance with ASTM D1556, ASTM D2167, ASTM D2922, or ASTM D3017.
- D. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D 698 ("standard Proctor"), ASTM D 1557 ("modified Proctor"), or AASHTO T 180.
- E. If tests indicate work does not meet specified requirements, remove work, replace and retest.
- F. Frequency of Tests:
  1. At areas to receive paving, at least one field density test for every 5,000 sq.ft. of subgrade area, but not less than three (3) tests.
  2. In each compacted fill layer, one field density test for every 5,000 sq.ft. of overlaying paved area, but not less than three (3) tests.
  3. In fill beneath structures, one field density test for every 2,500 sq.ft. in each layer.
  4. Other tests as deemed necessary by the Engineer
- G. If, the Engineer's opinion based on reports of the testing laboratory, subgrade or fills that have been placed are below specified density, provide additional compacting and testing until specified requirements are met.

1. Additional testing will be provided by the Owner's selected testing laboratory and all costs for the additional testing will be borne by the Contractor.

H. Proofrolling:

1. Upon request by the Engineer, proofroll the subgrade of structure foundations.
  - a. Make not less than three (3) passes of a 25 to 50 ton rubber tired roller over the full area.
  - b. Unstable, soft or otherwise unsuitable materials revealed by the proofrolling shall be removed and replaced with satisfactory material and compacted as specified herein.

### 3.09 DEWATERING

- A. Remove all surface and subsurface waters from excavations and maintain the excavation in a dry condition during construction operations.
- B. Maintain the water level below the excavation subgrade during excavation and construction.
  1. Material disturbed below the foundation subgrade due to improper dewatering shall be removed and replaced with crushed stone or lean concrete at no expense to the Owner.
  2. Use sumps, pumps, drains, trenching or well point system as necessary to maintain a dry excavation.
  3. Dewatering by trench pumping will not be permitted if migration of fine grained natural material (running sand) from bottom, side walls or bedding material will occur.
- C. Dispose of water pumped from excavations in storm drains having capacity, canals, trenches or other approved locations.
  1. Contractor is responsible for acquiring all permits required to discharge the water and shall protect waterways from turbidity during the operation.
  2. Prevent flooding of streets, roadways, or private property.
  3. Provide engines driving dewatering pumps with residential type mufflers.

### 3.10 CLEAN-UP

- A. Leave unused materials in a neat, compact stockpile.
- B. Leave borrow areas in a clean and neat condition. Grade to prevent standing surface water.
  1. Unstable, soft or otherwise unsuitable materials revealed by the proofrolling shall be removed and replaced with satisfactory material and compacted as specified herein.
- C. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stock

**3.11 MEASUREMENT AND PAYMENT**

- A. No separate measurement or direct payment will be made for the work under this section and all costs for same shall be included in the lump sum bid.

**END OF SECTION**

## SECTION 31 25 00

### EROSION AND SEDIMENTATION CONTROLS

#### PART 1 GENERAL

##### 1.01 DESCRIPTION

- A. Work included: Implement, Protect, Comply, and Enforce the Department of Health and Environmental Control approved construction stormwater pollution prevention plan (C-SWPPP) during the construction of this project to reduce soil erosion and siltation to the lowest reasonably achievable level.

##### 1.02 GENERAL

- A. Exercise every reasonable precaution, throughout the life of the project, to prevent the eroding of soil and the silting of rivers, streams, lakes, reservoirs, other water impoundments, ground or roadway surfaces, or other property. Erosion control practices to be used for this project are shown on the drawings and are to conform to South Carolina Department of Health and Environmental Control regulations.

#### PART 2 PRODUCTS

##### 2.01 CRUSHED STONE

- A. Provide #57 crushed stone for project entrance and exit.
- B. Provide #57 crushed stone for temporary sediment barriers around inlets and for temporary stone check dams.

##### 2.02 GRASSING

- A. Comply with Section 32 92 00 – Turf and Grasses.

##### 2.03 SILT FENCE

- A. Posts:
  - 1. Posts shall be self-fastener angle steel, 5' in length.
- B. Woven wire shall conform to the requirements of ASTM A 116, Class I zinc coating for wire. Each woven square shall measure 5.33" X 12". The top and bottom wires shall be 10 gauge. All other wires shall be 12-1/2 gauge.
- C. Filter fabric shall be synthetic fabric as manufactured by Celanese Fibers Co., DuPont, Industrial Netting or approved equal.

##### 2.04 EROSION CONTROL BLANKET

- A. Use erosion control blanket S150 and S250 of North American Green, or approved equal.

## **2.05 FILTER FABRIC (Temporary Stone Check Dam)**

- A. Use Stablenka Filter Fabric (T-140N), Mirafil (140N) or approved equal.

## **PART 3 EXECUTION**

### **3.01 GENERAL**

- A. Construct and maintain all erosion control measures until the substantial completion of the project.

### **3.02 TEMPORARY CONSTRUCTION ENTRANCE/EXIT**

- A. Construct a gravel area or pad at points where vehicles enter and leave a construction site.
- B. Clear the entrance and exit area of all vegetation, roots, and other objectionable material and properly grade and place gravel to the grade and dimensions shown on the plans.
- C. Construct drainage channels to carry water to a sediment trap or other suitable outlet.
- D. Use geotextile fabrics to improve stability of the foundation in locations subject to seepage or high water table.
- E. Maintain the gravel pad in a condition to prevent mud or sediment from leaving the construction site by periodic top dressing with two inches of stone.
- F. After each rainfall, inspect any structure used to trap sediment and clean it out as necessary.
- G. Immediately remove objectionable materials spilled, washed, or tracked onto public roadways.

### **3.03 TEMPORARY GRASSING**

- A. Provide a temporary cover for erosion control on disturbed areas that will remain unstabilized for a period of more than thirty (30) days in accordance with Section 32 92 00 – Turf and Grasses.
- B. This practice applies to cleared areas, diversions, dams, temporary sediment basins, temporary road banks, and topsoil stockpiles where vegetation is needed for less than one (1) year.
- C. Provide grassing on slope 5% or greater within fourteen (14) days of disturbance. Comply with Section 32 92 00 – Turf and Grasses.

### **3.04 SILT FENCE**

- A. Provide silt fence barrier where shown on the plans and on utility construction parallel to the disturbed trench where perpendicular sheet flow runoff occurs on disturbed areas with slopes greater than 4%.
- B. Place at the extreme limits of the area to be disturbed as shown on the plans.
- C. Construct temporary sediment barriers of filter fabric, buried at the bottom, stretched and supported by posts and install below small disturbed areas as indicated on the drawings to retain sediment by reducing the flow velocity to allow sediment deposition.

- D. Provide spacing between posts 5'-0" on center, minimum.
- E. Remove sediment deposits prior to reaching one-third height of the fence.
- F. Monitor site frequently and place additional silt fencing should evidence indicate that erosion is about to occur at locations other than those shown on plan.

**3.05 INLET PROTECTION**

- A. Construct temporary sediment barriers around storm drain curb inlets using block and gravel as indicated on the drawings.
- B. Inspect structure after each rainfall and repair as required.
- C. Remove sediment when trap reaches one-half capacity.
- D. Remove structure when protected areas have been stabilized.

**3.06 EROSION CONTROL BLANKET**

- A. Provide on areas as shown on the plans or on all embankments with slopes equal to or steeper than 2-1/2:1.

**3.07 TEMPORARY STONE CHECK DAMS**

- A. Utilize temporary stone check dams as indicated on the plans or directed by Engineer.
- B. Provide temporary stone check dams constructed of both rip-rap and #57 stone, as illustrated on the plans.

**3.08 MAINTENANCE**

- A. Place all erosion control devices or measures prior to any land disturbing activity within the drainage area they are located.
- B. Periodically check erosion control devices and clean or otherwise remove silt build-up as necessary to maintain them in proper working order.

**3.09 REMOVAL**

- A. Remove temporary structures after protected areas have been stabilized.

**3.10 MEASUREMENT AND PAYMENT**

- A. Payment will be made at the unit price as stated in the Bid Form for erosion control measures.

**END OF SECTION**

## **SECTION 31 37 00**

### **RIP RAP**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Furnishing all labor, materials, and equipment and performing all operations in conjunction with placing protective coatings of broken stone in accordance with these specifications and in conformity with the lines, grades and thicknesses shown on the plans or established by the Engineer.

##### **1.02 RELATED REQUIREMENTS**

- A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, and Sections in Division 1 of these Specifications.
- B. Section 31 23 16 – Excavation
- C. Section 31 23 23.13 – Backfill and Compaction
- D. Section 31 25 00 - Erosion and Sedimentation Control

##### **1.03 QUALITY ASSURANCE**

- A. Perform Work in accordance with State of South Carolina Department of Transportation Highways standard.
- B. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- C. Maintain one copy of each document on site.

##### **1.04 SUBMITTALS**

- A. Comply with pertinent provisions of Section 01 30 00.

#### **PART 2 PRODUCTS**

##### **2.01 MATERIALS**

- A. Riprap: Granite type; broken stone; solid and nonfriable; 6 inch minimum size, 12 inch maximum size.
- B. Aggregate: Granular fill as specified in Section 31 23 23.13.
- C. Filter Fabric
  - 1. Comply with Section 31 25 00.

#### **PART 3 EXECUTION**

##### **3.01 RIP-RAP PLACEMENT**

- A. Place riprap at culvert pipe ends, embankment slopes, and as indicated.
- B. Where thickness is not shown on the plans, it shall be 12-inches.
- C. The slope upon which this rip-rap is to be placed shall conform with the cross section shown on the plans or as directed by the Engineer.
- D. Properly compact depressions that may be filled in trimming and shaping the slope.
- E. Install filter fabric, lapping sides 12-inches.
- F. Begin placing in a trench at least 2-feet below the toe of the slope.
- G. Firmly imbed against the slope and the adjoining piece with the sides in contact and with broken joints.
- H. Fill the spaces between the larger pieces with spalls of suitable size, thoroughly ram into place.
- I. The finished surface shall present an even, tight surface true to line, grade and section.



**3.02 MEASUREMENT AND PAYMENT**

A. Payment will be made at the price per "Square Yard" as stated in the Bid Form for Rip Rap.

**END OF SECTION**

## SECTION 31 50 00

### EXCAVATION SUPPORT AND PROTECTION

#### PART 1 GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

##### 1.02 SUMMARY

- A. Section includes temporary excavation support and protection systems.
- B. Related Sections:
  - 1. Division 01 Section "Temporary Facilities and Controls" for temporary utilities and support facilities.

##### 1.03 PERFORMANCE REQUIREMENTS

- A. Design, furnish, install, monitor, and maintain excavation support and protection system capable of supporting excavation sidewalls and of resisting soil and hydrostatic pressure and superimposed and construction loads.
  - 1. Delegated Design: Design excavation support and protection system, including comprehensive engineering analysis by a licensed professional engineer in South Carolina, using performance requirements and design criteria indicated.
  - 2. Prevent surface water from entering excavations by grading, dikes, dewatering or other means.
  - 3. Install excavation support and protection systems without damaging existing buildings, structures and site improvements adjacent to excavation.
  - 4. Monitor vibrations, settlements and movements.

##### 1.04 SUBMITTALS

- A. Shop Drawings: For excavation support and protection system.
- B. Delegated-Design Submittal: For excavation support and protection system indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by a professional engineer licensed in South Carolina responsible for their preparation.
- C. Coordinate first paragraph below with qualification requirements in Division 01 Section "Quality Requirements." Qualification Data: For qualified professional engineer.

- D. Other Informational Submittals:
  - 1. Photographs: Show existing conditions of adjacent construction and site improvements that might be misconstrued as damage caused by the absence of, the installation of, or the performance of excavation support and protection systems. Submit before Work begins.
  - 2. Record Drawings: Identifying and locating capped utilities and other subsurface structural, electrical, or mechanical conditions.
    - a. Note locations and capping depth of wells and well points.

## 1.05 QUALITY ASSURANCE

- A. Pre-installation Conference: Conduct conference at Project site.
  - 1. Review methods and procedures related to excavation support and protection system including, but not limited to, the following:
    - a. Geotechnical report.
    - b. Existing utilities and subsurface conditions.
    - c. Proposed excavations.
    - d. Proposed equipment.
    - e. Monitoring of excavation support and protection system.
    - f. Working area location and stability.
    - g. Coordination with waterproofing.
    - h. Abandonment or removal of excavation support and protection system.

## 1.06 PROJECT CONDITIONS

- A. Interruption of Existing Utilities: Do not interrupt any utility serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:
  - 1. Notify Owner no fewer than two days in advance of proposed interruption of utility.
  - 2. Do not proceed with interruption of utility without Owner's written permission.
- B. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by geotechnical engineer. Owner will not be responsible for interpretations or conclusions drawn from the data.
  - 1. Make additional test borings and conduct other exploratory operations necessary for excavation support and protection.
  - 2. The geotechnical report is included elsewhere in the Project Manual.

- C. Survey Work: Engage a qualified land surveyor to survey adjacent existing buildings, structures, and site improvements; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.
  - 1. During installation of excavation support and protection systems, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations and positions for comparison with original elevations and positions. Promptly notify Engineer if changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. General: Provide materials that are either new or in serviceable condition.
- B. Structural Steel: ASTM A 36, ASTM A 690, or ASTM A 992.
- C. Steel Sheet Piling: ASTM A 328, ASTM A 572, or ASTM A 690; with continuous interlocks.
  - 1. Corners: Site-fabricated mechanical interlock.
- D. Shotcrete: Comply with "Shotcrete" Section in Specification 03 46 01 for shotcrete materials and mixes, reinforcement, and shotcrete application.
- E. Cast-in-Place Concrete: ACI 301, of compressive strength required for application.
- F. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
- G. Tiebacks: Steel bars, ASTM A 722.
- H. Tiebacks: Steel strand, ASTM A 416.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection system operations.
  - 1. Shore, support, and protect utilities encountered.
- B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
  - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- C. Locate excavation support and protection systems clear of permanent construction so that forming and finishing of concrete surfaces are not impeded.

- D. Monitor excavation support and protection systems daily during excavation progress and for as long as excavation remains open. Promptly correct bulges, breakage, or other evidence of movement to ensure that excavation support and protection systems remain stable.
- E. Promptly repair damages to adjacent facilities caused by installing excavation support and protection systems.

### **3.02 SOLDIER PILES AND LAGGING**

- A. Install steel soldier piles before starting excavation. Extend soldier piles below excavation grade level to depths adequate to prevent lateral movement. Space soldier piles at regular intervals not to exceed allowable flexural strength of wood lagging. Accurately align exposed faces of flanges to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment.
- B. Install wood lagging within flanges of soldier piles as excavation proceeds. Trim excavation as required to install lagging. Fill voids behind lagging with soil, and compact.
- C. Install wales horizontally at locations indicated on Drawings and secure to soldier piles.

### **3.03 SHEET PILING**

- A. Before starting excavation, install one-piece sheet piling lengths and tightly interlock to form a continuous barrier. Accurately place the piling, using templates and guide frames unless otherwise recommended in writing by the sheet piling manufacturer. Limit vertical offset of adjacent sheet piling to 60 inches. Accurately align exposed faces of sheet piling to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment. Cut tops of sheet piling to uniform elevation at top of excavation.

### **3.04 TIEBACKS**

- A. Tiebacks: Drill, install, grout, and tension tiebacks. Test load-carrying capacity of each tieback and replace and retest deficient tiebacks.
  - 1. Test loading shall be observed by a qualified professional engineer responsible for design of excavation support and protection system.
  - 2. Maintain tiebacks in place until permanent construction is able to withstand lateral soil and hydrostatic pressures.

### **3.05 BRACING**

- A. Bracing: Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move brace, install new bracing before removing original brace.
  - 1. Do not place bracing where it will be cast into or included in permanent concrete work unless otherwise approved by Engineer.
  - 2. Install internal bracing, if required, to prevent spreading or distortion of braced frames.
  - 3. Maintain bracing until structural elements are supported by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.

### **3.06 REMOVAL AND REPAIRS**

- A. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and bear soil and hydrostatic pressures. Remove in stages to avoid disturbing underlying soils or damaging structures, pavements, facilities, and utilities.
  - 1. Remove excavation support and protection systems to a minimum depth of 48 inches below overlaying construction and abandon remainder.
  - 2. Fill voids immediately with approved backfill compacted to density specified in Division 31 Section "Earth Moving."
  - 3. Repair or replace, as approved by Engineer, adjacent work damaged or displaced by removing excavation support and protection systems.
- B. Leave excavation support and protection systems permanently in place.

### **3.07 MEASUREMENT AND PAYMENT**

- A. No separate measurement or direct payment will be made for the work under this Section and all costs for same shall be included in the price bid for the item to which it pertains.

**END OF SECTION**

## SECTION 32 11 23

### AGGREGATE BASE COURSE

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Stone Base Course.
- B. Paving aggregates.

##### 1.02 RELATED REQUIREMENTS

- A. Documents affecting work of this Section include, but are not necessarily limited to Sections in Division 1 of these Specifications.
- B. Section 31 22 00 - Grading: Preparation of site for base course.
- C. Section 31 23 16.13 – Trenching for Site Utilities: Compacted fill over utility trenches under base course.
- D. Section 31 23 23.13 – Backfill and Compaction: Topsoil fill at areas adjacent to aggregate base course.
- E. Section 32 13 13 - Bituminous Concrete Paving: Binder and finish asphalt courses.

##### 1.03 REFERENCE STANDARDS

- A. AASHTO M 147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses; American Association of State Highway and Transportation Officials; 1965 (2012).
- B. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; American Association of State Highway and Transportation Officials; 2010
- C. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2006.
- D. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)); 2012.
- E. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2007.
- F. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN m/m<sup>3</sup>)); 2012.
- G. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2008.
- H. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2011.
- I. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth); 2005.

- J. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 2005.
- K. ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils; 2010.

#### **1.04 QUALITY ASSURANCE**

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

#### **1.05 PRODUCT HANDLING**

- A. Comply with pertinent provisions of Section 01 60 00.

#### **1.06 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Samples: 10 lb sample of each type of aggregate; submit in air-tight containers to testing laboratory.
- C. Materials Sources: Submit name of imported materials source.
- D. Aggregate Composition Test Reports: Results of laboratory tests on proposed and actual materials used.
- E. Compaction Density Test Reports.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. When necessary, store materials on site in advance of need.
- B. Aggregate Storage, General:
  - 1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
  - 2. Prevent contamination.
  - 3. Protect stockpiles from erosion and deterioration of materials.
- C. Verify that survey benchmarks and intended elevations for the Work are as indicated.

### **PART 2 PRODUCTS**

#### **2.01 MATERIALS**

- A. Coarse Aggregate Type retained on No. 4 sieve: Coarse aggregate, conforming to State of South Carolina Highway Department standard.
  - 1. Furnish a coarse aggregate consisting of hard, durable particles of stone, reasonably free from soft, thin, elongated or laminated pieces and deleterious substances.



2. Furnish aggregate with an abrasion loss of less than 65% as measured by the Los Angeles Abrasion Test.
- B. Fine Aggregate: Natural river or bank sand; washed; free of silt, clay, loam, friable or soluble materials, and organic matter.
1. Furnish a fine aggregate consisting of material produced by stone crushing operations.
  2. Liquid limit shall not exceed 25 and the plasticity index shall not exceed 6 when tested in accordance with AASH TO T-89 and T-90, respectively.
  3. Grade in accordance with ASTM D2487 Group Symbol SW.
  4. Graded in accordance with ASTM C136; within the following limits:
    - a. No. 4 sieve: 100 percent passing.
    - b. No. 14 sieve: 10 to 100 percent passing.
    - c. No. 50 sieve: 5 to 90 percent passing.
    - d. No. 100 sieve: 4 to 30 percent passing.
    - e. No. 200 sieve: 0 percent passing.
- C. Composite Mixture:
1. Produce in one crushing operation or by blending the fine and coarse aggregate in proper proportions.
  2. Graded in accordance with ASTM C136; within the following limits:
    - a. No. 2-0" Sieve 100 Percent Passing
    - b. No. 1-1/2" Sieve 95-100 Percent Passing
    - c. No. 1-0" Sieve 70-100 Percent Passing
    - d. No. 0-1/2" Sieve 48-75 Percent Passing
    - e. No. 4 Sieve 30-50Percent Passing
    - f. No. 30 Sieve 11-30 Percent Passing
    - g. No. 200 Sieve 0-12 Percent Passing
    - h. Liquid Limit 25 max.
    - i. Plasticity Index 6 max.
- D. Provide Aggregate Type Materials that comply with Section 305 of the South Carolina Department of Transportation Standard Specifications for Highway Construction, Latest Edition.

## **2.02 SOURCE QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for general requirements for testing and analysis of aggregate materials.
- B. Where aggregate materials are specified using ASTM D2487 classification, test and analyze samples for compliance before delivery to site.
- C. Where aggregate materials are specified using ASTM D2487 classification, testing of samples for compliance will be provided before delivery to site.
- D. If tests indicate materials do not meet specified requirements, change material and retest.
- E. Provide materials of each type from same source throughout the Work.

## **2.03 PRIME ASPHALT**

- A. Use either MC-30, RC-30, RC-70, or EA-P complying with requirements of Sections 406, 407 and 408 of the South Carolina Department of Transportation specifications.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that survey bench marks and intended elevations for the work are as indicated.
- B. Verify substrate has been inspected, gradients and elevations are correct, and is dry.

### **3.02 PREPARATION**

- A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and recompacting.
- B. Do not place aggregate on soft, muddy, or frozen surfaces.
- C. Proofroll all areas to receive crushed stone paving.
  - 1. Make not less than three passes over the full area, using a 35 to 50 ton rubber tired roller.
- D. Remove all soft, unstable or unsuitable material that will not compact readily.
  - 1. Remove to full depth of unsuitable material, or to a depth of 30-inches, whichever is less.
  - 2. Replace with satisfactory materials.
- E. Fill all holes, ruts or depressions which develop in the subgrade with approved on-site material, bringing subgrade to indicated line and grades.
- F. Compact subgrade using suitable construction procedures to provide not less than 95% Standard Proctor Maximum Dry Density.
- G. Seal roll the subgrade surface with a steel wheel roller, sealing the surface against excessive water infiltration.

- H. Preparation of Subgrade
  - 1. Proofroll all areas to receive crushed stone paving.
    - a. Make not less than three passes over the full area, using a 35 to 50 ton rubber tired roller.
  - 2. Remove all soft, unstable or unsuitable material that will not compact readily.
    - a. Remove to full depth of unsuitable material, or to a depth of 30-inches, whichever is less.
    - b. Replace with satisfactory materials.
  - 3. Fill all holes, ruts or depressions which develop in the subgrade with approved on-site material, bringing subgrade to indicated line and grades.
  - 4. Compact subgrade using suitable construction procedures to provide not less than 95% Standard Proctor Maximum Dry Density.
  - 5. Seal roll the subgrade surface with a steel wheel roller, sealing the surface against excessive water infiltration.

### **3.03 INSTALLATION**

- A. Spread aggregate over prepared substrate to a total compacted thickness of 6 inches.
- B. Under Bituminous Concrete Paving:
  - 1. Compact to 95 percent of maximum dry density.
- C. Place aggregate in maximum 4-inch layers and roller compact to specified density.
- D. Place aggregates using spreader boxes or other approved spreaders uniformly on one operation.
- E. Take care to avoid segregation of the fine from the coarse aggregate during handling, spreading or shaping operations.
- F. Mix, while at proper moisture, with motor grader or other equipment and maintain to required section and grade until thoroughly compacted.
- G. Level and contour surfaces to elevations and gradients indicated.
- H. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.
- I. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.
- J. Perform using 3-wheel steel wheel roller weighing not less than 10-tons, tandem roller weighing at least 8-tons, or other rollers approved by the Engineer.
- K. Start rolling at edges and proceed toward the center, continue rolling until aggregates are firmly keyed or set.

- L. When initial compaction is completed, should voids remain, place fine aggregates on the surface in an amount only sufficient to fill the voids.
- M. Broom, wet and roll until coarse aggregate is set, bonded and thoroughly compacted for full width and depth.
- N. Use mechanical tamping equipment in areas inaccessible to compaction equipment.
- O. Apply herbicide to finished surface.

### **3.04 TOLERANCES**

- A. Thickness tolerance: Provide the compacted thicknesses shown on the Drawings within a tolerance of minus 1/2-inch.
  - 1. Depth measurements will be made by digging through the base at intervals no closer than 250-feet, nor greater than 500-feet apart.
  - 2. Where thickness is less than depth specified minus 1/2-inch, it shall be corrected as directed by the Engineer.
- B. Variation From Design Elevation: Within 3/8- inch in 10-feet, parallel to the center line of the roadway nor more than 1/2-inch from a template conforming to the cross-sections illustrated on the Construction Plans.
- C. Deviations: Correct by removing materials, replacing with new materials, and reworking or recompacting as required.

### **3.05 FIELD QUALITY CONTROL**

- A. Compaction density testing will be performed on compacted aggregate base course in accordance with ASTM D1556.
- B. Compaction density testing will be performed on compacted aggregate base course in accordance with South Carolina Department of Transportation Standard Specifications for Highway Construction, Latest Edition.
- C. Results will be evaluated in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D698 ("standard Proctor").
- D. If tests indicate work does not meet specified requirements, remove work, replace and retest.
- E. Proof roll compacted aggregate at surfaces that will be under slabs-on-grade.
- F. Allow no traffic on surface until mixture has hardened sufficiently to prevent distortion.

### **3.06 PLACING PRIME COAT**

- A. Allow base course to season sufficiently to permit uniform penetration.
- B. Do not apply to wet surfaces or when the temperature is below 60°F in the shade and falling, or below 55°F in the shade and rising.
- C. Clean surfaces of all dust, dirt, clay, etc. using mechanical brooms, etc.

- D. Apply prime material, using pneumatic mounted distributors, at a rate of 0.25 to 0.30 gallon per square yard.
- E. Permit no traffic on primed surfaces until bituminous material has penetrated and dried sufficiently that it does not pick up under traffic.

**3.07 CLEANING**

- A. Leave unused materials in a neat, compact stockpile.
- B. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.
- C. Leave borrow areas in a clean and neat condition. Grade to prevent standing surface water.
- D. Allow no traffic on surface until mixture has hardened sufficiently to prevent distortion.

**END OF SECTION**

## SECTION 32 13 13

### BITUMINOUS CONCRETE PAVING

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Aggregate base course.
- B. Single course asphaltic concrete paving.
- C. Double course bituminous concrete paving.
- D. Surface sealer.

##### 1.02 RELATED REQUIREMENTS

- A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, and Sections in Division 1 of these Specifications.
- B. Section 31 22 00 - Grading.
- C. Section 31 23 23.13 – Backfill and Compaction.
- D. Section 32 11 23 - Aggregate Base Course.

##### 1.03 REFERENCE STANDARDS

- A. AI MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types; The Asphalt Institute; 1997.
- B. AI MS-19 - A Basic Asphalt Emulsion Manual; The Asphalt Institute; Fourth Edition.
- C. ASTM D946 - Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction; 2009a.

##### 1.04 QUALITY ASSURANCE

- A. Perform Work in accordance with State of South Carolina Department of Transportation Highways standard.
- B. Mixing Plant: Conform to State of South Carolina Department of Transportation Highways standard.
- C. Obtain materials from same source throughout.
- D. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

##### 1.05 REGULATORY REQUIREMENTS

- A. Conform to applicable code for paving work on public property.

## 1.06 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 30 00.
- B. Product data: Within fourteen (14) calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
  - 1. Materials list of items proposed to be provided under this Section.
  - 2. Certificates, signed by the materials producer and the asphalt paving Subcontractor, stating that materials meet or exceed the specified requirements.

## 1.07 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01 60 00.

## 1.08 FIELD CONDITIONS

- A. Do not place asphalt when ambient air or base surface temperature is less than 40 degrees F in the shade and falling, or below 35°F in the shade and rising, or if surface is wet or frozen.
- B. Place bitumen mixture when temperature is not more than 15 F degrees below bitumen supplier's bill of lading and not more than maximum specified temperature.

## PART 2 PRODUCTS

### 2.01 MATERIALS

- A. Asphalt Cement: ASTM D946.
- B. All Materials: In accordance with State of South Carolina Department of Transportation Highways standards.
- C. All Materials: In accordance with State of South Carolina Department of Transportation Standard Specifications for Highway Construction, latest Edition.
- D. Aggregate for Base Course: Angular crushed washed stone; free of shale, clay, friable material and debris.
  - 1. Graded in accordance with ASTM D2487 Group Symbol GW.
  - 2. Graded in accordance with ASTM C136, within the following limits:
    - a. 2 inch sieve: 100 percent passing.
    - b. 1 inch sieve: 95 percent passing.
    - c. 3/4 inch sieve: 95 to 100 percent passing.
    - d. 5/8 inch sieve: 75 to 100 percent passing.
    - e. 3/8 inch sieve: 55 to 85 percent passing.
    - f. No. 4 sieve: 35 to 60 percent passing.

- g. No. 16 sieve: 15 to 35 percent passing.
  - h. No. 40: 10 to 25 percent passing.
  - i. No. 200: 5 to 10 percent passing.
- E. Aggregate for Binder Course: Angular crushed washed stone; free of shale, clay, friable material and debris.
- 1. Graded in accordance with ASTM D2487 Group Symbol GW.
  - 2. Graded in accordance with ASTM C136, within the following limits:
    - a. 2 inch sieve: 100 percent passing.
    - b. 1 inch sieve: 95 percent passing.
    - c. 3/4 inch sieve: 95 to 100 percent passing.
    - d. 5/8 inch sieve: 75 to 100 percent passing.
    - e. 3/8 inch sieve: 55 to 85 percent passing.
    - f. No. 4 sieve: 35 to 60 percent passing.
    - g. No. 16 sieve: 15 to 35 percent passing.
    - h. No. 40: 10 to 25 percent passing.
    - i. No. 200: 5 to 10 percent passing.
- F. Fine Aggregate: In accordance with State of South Carolina Department of Transportation Highways standards.
- G. Mineral Filler: Finely ground particles of limestone, hydrated lime or other mineral dust, free of foreign matter.
- H. Primer: In accordance with State of South Carolina Department of Transportation Highways standards.
- I. Tack Coat: Homogeneous, medium curing, liquid asphalt.

## **2.02 ASPHALT PAVING MIXES AND MIX DESIGN**

- A. Use dry material to avoid foaming. Mix uniformly.
- B. Base Course: 3.0 to 6 percent of asphalt cement by weight in mixture in accordance with AI MS-2.
- C. Binder Course: 4.5 to 6 percent of asphalt cement by weight in mixture in accordance with AI MS-2.
- D. Submit proposed mix design of each class of mix for review prior to beginning of work.



### **2.03 ASPHALTIC CONCRETE MIXTURE (BINDER COURSE)**

- A. Materials and composition of mixture shall comply with Section 402 of the SCDOT's "Standard Specifications for Type 1 Mix".
- B. Provide hot plant mixed asphaltic concrete paving materials.
  - 1. Temperature leaving the plant: 290°F minimum, 320°F maximum.
  - 2. Temperature at time of placing: 280°F minimum.

### **2.04 ASPHALTIC CONCRETE MIXTURE (SURFACE COURSE)**

- A. Materials and composition of mixture shall comply with Section 403 of the SCDOT's "Standard Specifications for Type B Mix."
- B. Provide hot plant mixed asphaltic concrete paving materials.
  - 1. Temperature leaving the plant: 290°F minimum, 320°F maximum.
  - 2. Temperature at time of placing: 280°F minimum.

### **2.05 EQUIPMENT**

- A. Comply with requirements of Section 401 of SCDOT's "Standard Specifications".

### **2.06 SOURCE QUALITY CONTROL**

- A. Test mix design and samples in accordance with AI MS-2.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that compacted subgrade is dry and ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct.

### **3.02 SURFACE CONDITIONS**

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
  - 1. Sweep primed surfaces if needed.
  - 2. Adjust frames and covers if needed.

### **3.03 BASE COURSE**

- A. Place and compact base course.
- B. On arrival at point of use, dump directly into mechanical spreader.

- C. Immediately spread and strike off true to the line, grade and cross section indicated, to such loose depth that when work is completed, the indicated thickness or weight per square yard will be secured.
- D. Correct irregularities while the mixture is still hot.
- E. At locations not readily accessible to mechanical spreaders, acceptable hand spreading methods may be used.
- F. Finished surfaces placed adjacent to curbs, gutters, manholes, etc., shall be approximately 1/4-inch above the edges of these structures.
- G. Section 32 11 23 - Aggregate Base Course.

#### **3.04 COMPACTION**

- A. Perform initial rolling with 3-wheel steel roller or a steel wheel 2-axle tandem roller.
- B. Follow initial rolling with at least four complete coverages by a pneumatic tired roller.
- C. Complete rolling with steel wheel 2-axle tandem roller.
- D. Rolling shall start longitudinally at the sides and proceed gradually toward the center of the pavement, overlapping on successive trips approximately 1/2 the width of the roller.
- E. Use hand or mechanical tampers in areas not accessible to powered rollers.
- F. Surface mixture after compaction shall be smooth and true to the established crown and grade.

#### **3.05 PREPARATION – PRIMER**

- A. Apply primer in accordance with manufacturer's instructions.
- B. Apply primer on aggregate base or sub-base at uniform rate of 1/3 gal/sq yd.
- C. Use clean sand to blot excess primer.

#### **3.06 PREPARATION - TACK COAT**

- A. Apply tack coat in accordance with manufacturer's instructions.
- B. Apply tack coat on asphalt or concrete surfaces over subgrade surface at uniform rate of 1/3 gal/sq yd.
- C. Apply tack coat to contact surfaces as required.
- D. Coat surfaces of manhole frames with oil to prevent bond with asphalt pavement. Do not tack coat these surfaces.

#### **3.07 SEAL COAT**

- A. Apply seal coat to surface course and asphalt curbs in accordance with AI MS-19.

#### **3.08 TOLERANCES**

- A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.

- B. Compacted Thickness: Within 1/4 inch of specified or indicated thickness.
- C. Variation from True Elevation: Within 1/8 inch, in 6-feet.
- D. Free from Bird Baths.

### **3.09 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for general requirements for quality control.
- B. Provide field inspection and testing. Take samples and perform tests in accordance with AI MS-2.
- C. Flood Test
  - 1. Flood the entire asphaltic concrete paved area with water by use of a tank truck or hoses.
  - 2. If a depression is found where water ponds to a depth of more than 1/8-inch in 6-feet, fill or otherwise correct to provide proper drainage.
  - 3. Feather and smooth the edges of fill so that the joint between fill and original surface is invisible.

### **3.10 PROTECTION**

- A. Allow no traffic on surface until the mixture has hardened sufficiently to prevent distortion.

**END OF SECTION**

**SECTION 32 17 23**  
**PAVEMENT MARKINGS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Roadway lane markings.

**1.02 RELATED REQUIREMENTS**

- A. Section 32 13 13 - Bituminous Concrete Paving.

**1.03 REFERENCE STANDARDS**

- A. FS TT-B-1325 - Beads (Glass Spheres); Retro-Reflective; Rev. D, 2007.
- B. FS TT-P-1952 - Paint, Traffic Black, and Airfield Marking, Waterborne; Rev. E, 2007.
- C. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; current edition, [www.paintinfo.com](http://www.paintinfo.com).
- D. FHWA MUTCD - Manual on Uniform Traffic Control Devices for Streets and Highways; U.S. Department of Transportation, Federal Highway Administration; <http://mutcd.fhwa.dot.gov>; current edition.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
- C. Certificates: Submit for each batch of paint and glass beads stating compliance with specified requirements.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
  - 2. Extra Paint: 2 containers, 1 gallon size, of each type and color.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver paint in containers of at least 5 gallons accompanied by batch certificate.
- B. Deliver glass beads in containers suitable for handling and strong enough to prevent loss during shipment accompanied by batch certificate.
- C. Store products in manufacturer's unopened packaging until ready for installation.
- D. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

**1.06 FIELD CONDITIONS**

- A. Do not install products under environmental conditions outside manufacturer's absolute limits.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Line and Zone Marking Paint: MPI No. 97 Latex Traffic Marking Paint; color(s) as indicated.
  - 1. Roadway Markings: As required by authorities having jurisdiction.
  - 2. Parking Lots: Yellow.
  - 3. Handicapped Symbols: Blue.
- B. Paint For Obliterating Existing Markings: FS TT-P-1952; black for bituminous pavements, gray for portland cement pavements.
- C. Reflective Glass Beads: FS TT-B-1325, Type I (low index of refraction), Gradation A (coarse, drop-on); with silicone or other suitable waterproofing coating to ensure free flow.

- D. Temporary Marking Tape: Preformed, reflective, pressure sensitive adhesive tape in color(s) required; Contractor is responsible for selection of material of sufficient durability as to perform satisfactorily during period for which its use is required.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Engineer of unsatisfactory preparation before proceeding.

#### **3.02 PREPARATION**

- A. Allow new pavement surfaces to cure for a period of not less than 14 days before application of marking materials.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Obliteration of existing markings using paint is acceptable in lieu of removal; apply the black paint in as many coats as necessary to completely obliterate the existing markings.
- D. Clean surfaces thoroughly prior to installation.
  - 1. Remove dust, dirt, and other granular surface deposits by sweeping, blowing with compressed air, rinsing with water, or a combination of these methods.
  - 2. Completely remove rubber deposits, existing paint markings, and other coatings adhering to the pavement, by scraping, wire brushing, sandblasting, mechanical abrasion, or approved chemicals.
  - 3. Sandblasting: Use equipment of size and capacity necessary, providing not less than 150 cfm of air at pressure not less than 90 psi at each nozzle used.
- E. Where oil or grease are present, scrub affected areas with several applications of trisodium phosphate solution or other approved detergent or degreaser, and rinse thoroughly after each application; after cleaning, seal oil-soaked areas with cut shellac to prevent bleeding through the new paint.
- F. Establish survey control points to determine locations and dimensions of markings; provide templates to control paint application by type and color at necessary intervals.
- G. Temporary Pavement Markings: When required or directed by Engineer, apply temporary markings of the color(s), width(s) and length(s) as indicated or directed.
  - 1. After temporary marking has served its purpose, remove temporary marking by carefully controlled sandblasting, approved grinding equipment, or other approved method so that surface to which the marking was applied will not be damaged.
  - 2. At Contractor's option, temporary marking tape may used in lieu of temporary painted marking; remove unsatisfactory tape and replace with painted markings at no additional cost to Owner.

#### **3.03 INSTALLATION**

- A. Begin pavement marking as soon as practicable after surface has been cleaned and dried.
- B. Do not apply paint if temperature of surface to be painted or the atmosphere is less than 50 degrees F or more than 95 degrees F.
- C. Apply in accordance with manufacturer's instructions using an experienced technician that is thoroughly familiar with equipment, materials, and marking layouts.
- D. Comply with FHWA MUTCD manual (<http://mutcd.fhwa.dot.gov>) for details not shown.
- E. Apply markings in locations determined by measurement from survey control points; preserve control points until after markings have been accepted.
- F. Apply uniformly painted markings of color(s), lengths, and widths as indicated on the drawings true, sharp edges and ends.
  - 1. Apply paint in one coat only.

2. Wet Film Thickness: 0.015 inch, minimum.
  3. Length Tolerance: Plus or minus 3 inches.
  4. Width Tolerance: Plus or minus 1/8 inch.
- G. Roadway Traffic Lanes: Use suitable mobile mechanical equipment that provides constant agitation of paint and travels at controlled speeds.
1. Conduct operations in such a manner that necessary traffic can move without hindrance.
  2. Place warning signs at the beginning of the wet line, and at points well in advance of the marking equipment for alerting approaching traffic from both directions. Place small flags or other similarly effective small objects near freshly applied markings at frequent intervals to reduce crossing by traffic.
  3. If paint does not dry within expected time, discontinue paint operations until cause of slow drying is determined and corrected.
  4. Skip Markings: Synchronize one or more paint "guns" to automatically begin and cut off paint flow; make length of intervals as indicated.
  5. Use hand application by pneumatic spray for application of paint in areas where a mobile paint applicator cannot be used.
  6. Distribute glass beads uniformly on the paint lines within ten seconds without any waste, applied at rate of 6 pounds per gallon of paint; if the marking equipment does not have a glass bead dispenser, use a separate piece of equipment adjusted and synchronized with the paint applicator; remove and replace markings having faulty distribution of beads.
- H. Parking Lots: Apply parking space lines, entrance and exit arrows, painted curbs, and other markings indicated on drawings.
1. Mark the International Handicapped Symbol at indicated parking spaces.
  2. Hand application by pneumatic spray is acceptable.
- I. Symbols: Use a suitable template that will provide a pavement marking with true, sharp edges and ends, of the design and size indicated.

#### **3.04 DRYING, PROTECTION, AND REPLACEMENT**

- A. Protect newly painted markings so that paint is not picked up by tires, smeared, or tracked.
- B. Provide barricades, warning signs, and flags as necessary to prevent traffic crossing newly painted markings.
- C. Allow paint to dry at least the minimum time specified by the applicable paint standard and not less than that recommended by the manufacturer.
- D. Remove and replace markings that are applied at less than minimum material rates; deviate from true alignment; exceed length and width tolerances; or show light spots, smears, or other deficiencies or irregularities.
- E. Remove markings in manner to avoid damage to the surface to which the marking was applied, using carefully controlled sand blasting, approved grinding equipment, or other approved method.
- F. Replace removed markings at no additional cost to Owner.

**END OF SECTION**

**SECTION 32 92 00**  
**TURF AND GRASSES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Seeding and Fertilization
- B. Provide grassing for the area specified herein, or as indicated, for a complete and proper installation.
- C. Water and sanitary sewer easements, including highway and street shoulders: All areas disturbed by the construction process.

**1.02 RELATED REQUIREMENTS**

- A. Documents affecting work in this section include, but are not necessarily limited to, General Conditions, and Sections in Division 1 of these Specifications.
- B. Section 31 23 23.13 – Backfill and Compaction
- C. Section 31 25 00 – Erosion and Sedimentation Control

**1.03 DEFINITIONS**

- A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Johnsongrass, Poison Ivy, Nut Sedge, Nimble Will, Blindweed, Bentgrass, Wild Garlic, Perennial Sorrel, and Brome Grass.

**1.04 QUALITY ASSURANCE**

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Seed: Conform to all State laws and to all requirements and regulations of the South Carolina Department of Agriculture.
  - 1. Deliver to site each variety of seed individually packaged and tagged to show name, net weight, origin, and lot number.
- C. Fertilizer: Conform to State fertilizer law.

**1.05 SUBMITTALS**

- A. See Section 01 30 00 – Administrative Requirements, for submittal procedures.
- B. Comply with pertinent provisions of Section 01 30 00.
- C. Product Data: Within 15 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:

1. Complete materials list of items proposed to be provided under this Section.
2. Material Safety Data Sheets for all materials to be used.
3. Installation/Application Instructions for all relevant materials (i.e. erosion blankets, hydraulic mulches)

#### **1.06 DELIVERY, STORAGE AND HANDLING**

- A. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable. Deliver seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.
- B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.
- C. Comply with pertinent provisions of Section 01 60 00 – Product Requirements
- D. At time of delivery, furnish the Engineer invoices of all materials received in order that application rates may be determined.
- E. Immediately remove from the site materials that do not comply with the specified requirements, and promptly replace with materials meeting the specified requirements.

### **PART 2 PRODUCTS**

#### **2.01 GRASS SEED**

- A. Provide grass seed that is:
  1. Free from noxious weed seeds
  2. Current year crop seed
  3. Treated with appropriate fungicide at time of mixing
  4. Delivered to the site in sealed containers with dealer's guaranteed analysis
- B. Water: Clean, fresh and free of substances that could inhibit vigorous growth of grass.
- C. Stakes: Softwood lumber, chisel pointed
- D. String: inorganic fiber
- E. Lime and pH Adjustment
  1. For Dry Seeding operations provide agricultural grade, standard ground limestone conforming to the current "Rules, Regulations and Standards of the Fertilizer Board of Control" issued at Clemson University.
  2. For Hydraulic Seeding operations, provide NeutraLime® Dry by Profile Products to raise pH or Aqua-pHix® by Profile Products to lower pH at rate determined by soil analysis or at manufacturer's recommended rate.



3. Bag tags or delivery slip for bulk loads shall indicate brand or trade name, calcium carbonate equivalent, and other pertinent data to identify the lime.
- F. Wood Fiber Mulch
1. Provide 100% thermally processed wood fiber or blended 70/30 wood/cellulose fiber manufactured specifically for discharging uniformly on the ground surface when dispersed by a hydro-seeding machine.
  2. Material shall contain thermally processed wood fibers so as to contain no germination or growth inhibiting factors and to achieve phyto-sanitization.
  3. Material shall contain basic green dye to facilitate visual metering.
- G. Flexterra HP-FGM
1. Provide Flexterra HP-FGM® as manufactured by Profile Products.
  2. Material shall contain thermally refined wood fibers and crimped synthetic fibers so as to contain no germination or growth inhibiting factors.
  3. Materials shall contain non-toxic green dye to facilitate metering.
  4. Material shall be 100% Bio-degradable.
- H. Straw Mulch/Dry Applied Mulching Pellets
1. Provide straw or hay material.
    - a. Straw to be stalks of wheat, rye, barley or oats.
    - b. Hay to be timothy, peavine, alfalfa or coastal Bermuda
  2. Material to be reasonably dry and reasonably free from mature seed bearing stalks, roots, or bulblets or Johnson Grass, Nutgrass, Wild Onion or any other Noxious weeds detailed in part 1.04 of this Section.
  3. Seed Aide Aero® manufactured by Profile Products at a rate of 3,000 LBS/ACRE can be used as a weed free alternative to straw mulch.
- I. Erosion Control Blanket
1. Provide on areas as shown on the plans
  2. Provide Erosion Control Blanket S-2®, from Western Excelsior, or approved equal.

## 2.02 TESTS

- A. Provide analysis of topsoil fill under provisions of Section 01 40 00 – Quality Requirements
- B. Analyze to ascertain the percentage of nitrogen, phosphorus, potash, soluble salt content, organic matter, and pH value.
- C. Submit minimum 10 oz (280 g) sample of topsoil proposed. Forward sample to approved testing laboratory in sealed containers to prevent contamination.

- D. Testing is not required if recent test are available for imported topsoil. Submit these test results to the testing laboratory for approval. Indicate, by test results, information necessary to determine suitability.
- E. If pH is not in the range of 6.0 to 7.0, adjust accordingly with Lime.
- F. Organic matter must be 2.0% or greater. If organic matter percentage is less than 2%, contractor shall apply JumpStart® and/or BioPrime® by Profile Products to modify soil organic matter. JumpStart and BioPrime to be applied at rate determined by soil analysis or at manufacturer's recommended rate

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that prepared soil base is ready to receive the work of this Section.

### **3.02 PREPARATION**

- A. Seed these areas immediately upon completion of grading or construction and cleanup operations.
  - 1. Slopes greater than 4:1
  - 2. Utility right-of-ways or any other disturbed area adjacent to wetlands.
- B. Bring all areas to proper line, grade and cross section indicated on the plans.
- C. Repair erosion damage prior to commencing seeding operations.
- D. Loosen seed bed to a minimum depth of 3" and track in slope so as the direction of the track marks is perpendicular to the direction of the slope.
- E. Ensure a minimum of 2-inches of topsoil exists in areas to be seeded.
- F. Remove all roots, clods, stones larger than 1" in any dimension, and other debris.

### **3.03 FERTILIZATION**

- A. Apply fertilizer in accordance with manufacturer's instructions, and the Soil Analyses as detailed in part 2.03 of this Section.
- B. Apply after smooth raking of topsoil and prior to roller compaction.
- C. Mix thoroughly into upper 2 inches (50 mm) of topsoil.
- D. If seeding using a hydro-seeder apply fertilizer in slurry with mulch, seed, and lime.
- E. Spread uniformly over areas to be seeded at:
  - 1. Rate of 11 LBS/1000 sq. ft. when using 19-19-19.
  - 2. Rate of 20 LBS/1000 sq. ft. when using 10-10-10.
  - 3. Use approved mechanical spreaders for dry seeding application.

- F. Second Application of Fertilizer
  - 1. When plants are established and showing satisfactory growth, apply Nitrogen at the rate of 1 lb. per 1000 sq. ft.
  - 2. Apply using dry seeding application unless otherwise directed by Engineer.
  - 3. Do not apply to stands of temporary grasses.

### 3.04 SEEDING

- A. Mixtures of different types of seed for the various schedules shall be weighted and mixed in proper proportions in the presence of the Engineer.
- B. Permanent Seeding Mix – Slopes 4:1 or Greater
  - 1. Schedule No. 1 – Planting Dates April 1 – September 15:
    - a. Slopemaster® Spring/Summer Mix by Pennington Seed, Inc.
      - 25% Hulled Sahara Bermudagrass
      - 25% Unhulled Sahara Bermudagrass
      - 25% Pensacola Bahiagrass
      - 10% Durana White Clover
      - 10% Brown Top Millet
      - 5% Weeping Lovegrass
    - b. Rate 75 LBS/ACRE or 1.75 LBS/1000 sq. ft.
    - c. Seed to be coated with MYCO Advantage by Pennington Seed, Inc.
    - d. Contact: Pennington Seed, Inc., 1236 Eden Street, Columbia, SC 29201 – Jay Sprague – 803-608-5963
  - 2. Schedule No. 2 – Planting Dates September 15 – March 31:
    - a. Slopemaster Fall/Winter Mix by Pennington Seed, Inc.
      - 25% Unhulled Sericea Lespedeza
      - 20% Unhulled Sahara Bermudagrass
      - 20% Greystone Tall Fescue
      - 10% Pensacola Bahiagrass
      - 10% Durana White Clover
      - 10% Rye Grain
      - 5% Weeping Lovegrass
    - b. Rate 100 LBS/ACRE or 2.25 LBS/1000 sq. ft.
    - c. Seed to be coated with MYCO Advantage by Pennington Seed, Inc.
    - d. Contact: Pennington Seed, Inc., 1236 Eden Street, Columbia, SC 29201 – Jay Sprague – 803-608-5963
- C. Permanent Seeding Mix – Slopes 4:1 or Less
  - 1. Schedule No. 1 – Planting Dates April 1 – September 15:

- a. Hulled Sahara® Bermudagrass
    - b. Rate 75 LBS/ACRE or 1.75 LBS/1000 sq. ft.
  - 2. Schedule No. 2 – Planting Dates September 15 – March 31:
    - a. Unhulled Sahara Bermudagrass
    - b. Rate 100 LBS/ACRE or 2.25 LBS/1000 sq. ft.
- D. Temporary Seeding Mix – All Disturbed Areas
  - 1. Schedule No. 1 – Planting Dates April 1 – September 15:
    - a. Brown Top Millet
      - Rate 45 LBS/ACRE or 1 LBS/1000 sq. ft.
  - 2. Schedule No. 2 – Planting Dates September 15 – March 31:
    - a. Rye Grain
      - Rate 80 LBS/ACRE or 2 LBS/1000 sq. ft.
- E. Do not seed areas in excess of that which can be mulched on same day.
- F. Do not sow during rain, when the ground is too dry, or during windy periods.
- G. Immediately following seeding and compacting, apply mulch to a thickness of 1/8 inches (3 mm). Maintain clear of shrubs and trees.
- H. Apply water with a fine spray immediately after each area has been mulched. Saturate to 4 inches (100 mm) of soil.
- I. Following germination, immediately re-seed areas without germinated seeds that are larger than 4 by 4 inches (100 mm by 100mm).

### **3.05 SOWING METHODS**

- A. General:
  - 1. Perform seeding during the periods and at the rates specified in the seeding schedules.
  - 2. Do not conduct seeding work when ground is frozen or excessively wet.
  - 3. Produce satisfactory stand of grass regardless of period of the year the Work is performed.
- B. Seeding, slopes less than four horizontal to one vertical:
  - 1. Seeding of slopes of 4:1 or less will be done in one of the following two ways:

2. Dry Seeding:
  - a. Sow seed not more than 24 hours after application of fertilizer and lime.
  - b. Use mechanical seed drills on accessible areas, rotary hand seeders, power sprayers, etc. may be used on steep slopes or areas not accessible to seed drills.
  - c. Cover seed and lightly compact with culti-packer if seed drill does not.
  - d. Within 24 hours following compaction of seeded areas, uniformly apply straw mulch, as defined in Section 2.01, at a rate of 4000 LBS/ACRE or 90 LBS/1000 sq. ft.

3. Hydraulic Seeding:
  - a. Apply seed, fertilizer, lime, and wood fiber mulch using hydraulic equipment.
  - b. Equipment to have built-in agitation system with capacity to agitate, suspend and homogeneously mix a slurry of the specified amount of fiber, fertilizer, seed, lime, and water.
  - c. Minimum capacity of slurry tank: 1000 gallons.
  - d. Apply 100% wood or 70/30 wood/cellulose blend fiber mulch, defined in Section 2.01, at a rate of 2500 LBS/ACRE or 60 LBS/1000 sq. ft.
  - e. Regulate slurry mixture so that amounts and rates of application will result in uniform application of all materials at not less than the specified amounts.
  - f. Apply slurry in two directions so as to avoid "shadowing."
  - g. Use color of fiber mulch as guide, spraying the prepared seed bed until a uniform visible coat is obtained.

C. Seeding, slopes greater than four horizontal to one vertical:

1. Seeding of slopes of 4:1 or greater will be done in one of the following two ways
2. Dry Seeding:
  - a. Sow seed not more than 24 hours after application of fertilizer and lime.
  - b. Use mechanical seed drills on accessible areas, rotary hand seeders, power sprayers, etc. may be used on steep slopes or areas not accessible to seed drills.
  - c. Cover seed and lightly compact with culti-packer if seed drill does not.
  - d. Within 24 hours following compaction of seeded areas, uniformly lay double netted excelsior blanket, as defined in Section 2.01, over seeded areas. Excelsior blanket installation and staple pattern shall conform strictly to manufacturer's instructions.

3. Hydraulic Seeding:
  - a. Apply seed, fertilizer, lime, and Flexterra HP-FGM mulch using hydraulic equipment.
  - b. Equipment to have built-in agitation system with capacity to agitate, suspend and homogeneously mix a slurry of the specified amount of fiber, fertilizer, seed, lime, and water.
  - c. Minimum capacity of slurry tank: 1000 gallons.
  - d. Apply Flexterra HP FGM, as defined in Section 2.01, at a rate of 3000 LBS/ACRE or 68 LBS/1000 sq. ft.
  - e. Regulate slurry mixture so that amounts and rates of application will result in uniform application of all materials at not less than the specified amounts.
  - f. Apply slurry in two directions so as to avoid "shadowing."
  - g. Use color of fiber mulch as guide, spraying the prepared seed bed until a uniform visible coat is obtained.

### **3.06 MAINTENANCE**

- A. Water to prevent grass and soil from drying out.
- B. Roll surface to remove minor depressions or irregularities.
- C. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions.
- D. Remedy damage resulting from improper use of herbicides.
- E. Areas not showing satisfactory evidence of germination within six weeks of the seeding or which show bare spots, shall be immediately reseeded, fertilized and/or mulched.
- F. Protect seeded areas with warning signs during maintenance period.
- G. Maintain all seeded areas in satisfactory condition until final acceptance of Work.
- H. Repair any eroded areas.
- I. Mow as necessary to maintain healthy growth rate until final acceptance of the Work.

### **3.07 ACCEPTANCE**

- A. Permanently seeded areas will be accepted when the stand of grass reaches 70% coverage.
- B. No acceptance will be made of temporary seeded areas.

### **3.08 MEASUREMENT AND PAYMENT**

- A. Payment will be made at the unit price per "acre" as stated in the Bid Form for grassing.

**END OF SECTION**

**SECTION 33 05 13  
MANHOLES AND COVERS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Monolithic concrete manholes with masonry transition to lid frame, covers, anchorage, and accessories.
- B. Modular precast concrete manhole sections with tongue-and-groove joints with masonry transition to lid frame, covers, anchorage, and accessories.
- C. Monolithic FRP manholes with transition to lid frame, covers, anchorage, and accessories.
- D. Masonry manhole sections with masonry transition to lid frame, covers, anchorage, and accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 03 30 00 - Cast-in-Place Concrete.

**1.03 PRICE AND PAYMENT PROCEDURES**

- A. Manhole: By the unit. Includes excavating, concrete base pad, concrete manhole sections, FRP manhole sections, brick masonry manhole construction, brick masonry transition to cover frame, cover frame and cover, to indicated depth, forming and sealing pipe inlets and outlets.

**1.04 REFERENCE STANDARDS**

- A. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries; American Concrete Institute International; 2011.
- B. ASTM A48/A48M - Standard Specification for Gray Iron Castings; 2003 (Reapproved 2012).
- C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2012.
- D. ASTM C55 - Standard Specification for Concrete Building Brick; 2011.
- E. ASTM C62 - Standard Specification for Building Brick (Solid Masonry Units Made From Clay or Shale); 2013.
- F. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections; 2013.
- G. ASTM C478M - Standard Specification for Precast Reinforced Concrete Manhole Sections [Metric]; 2013.
- H. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals; 2008 (Reapproved 2013).
- I. ASTM C923M - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals [Metric]; 2008b.
- J. ASTM C1634 - Standard Specification for Concrete Facing Brick; 2011.
- K. ASTM D3753 - Standard Specification for Glass-Fiber-Reinforced Polyester Manholes and Wetwells; 2012.

**1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate manhole locations, elevations, piping sizes and elevations of penetrations.
- C. Product Data: Provide manhole covers, component construction, features, configuration, and dimensions.

**1.06 QUALITY ASSURANCE**

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

## **1.07 FIELD CONDITIONS**

- A. Cold and Hot Weather Requirements: Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.
- B. Maintain materials and surrounding air temperature to minimum 50 degrees F prior to, during, and 48 hours after completion of masonry work.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. Manhole Sections: Reinforced precast concrete in accordance with ASTM C478 (ASTM C478M), with resilient connectors complying with ASTM C923 (ASTM C923M).
- B. Manhole Sections: ASTM D3753, glass-fiber reinforced polyester with integral steps.
- C. Concrete: As specified in Section 03300.
- D. Concrete Brick Units: ASTM C1634 or ASTM C 55 Grade N, cored, normal weight; nominal modular size of 4 x 8 x 16 inches.
- E. Concrete Brick Units: As specified in Section 04810.
- F. Clay Brick Units: ASTM C62, Grade SW solid units; nominal modular size of 2-1/4 x 3-5/8 x 7-5/8 in.
- G. Clay Brick Units: As specified in Section 04810.
- H. Mortar and Grout: As specified in Section 04810, Type S.
- I. Mortar and Grout: As specified in Section 04065, Type S.
- J. Reinforcement: Formed steel wire, galvanized finish, wire diameter as indicated on drawings.
- K. Concrete Reinforcement: As specified in Section 03300.

### **2.02 COMPONENTS**

- A. Lid and Frame: ASTM A48/A48M, Class 30B Cast iron construction, machined flat bearing surface, removable lockable lid, closed lid design; live load rating of H20 psf; sealing gasket; lid molded with identifying name;. Provide R 1552 manufactured by Neenah Foundry or equal.
- B. Manhole Steps: Formed galvanized steel rungs; 3/4 inch diameter. Formed integral with manhole sections.
- C. Strap Anchors: Bent steel shape, 9 x 10 inch size x 1 5/8 inch thick, galvanized to ASTM A123/A123M, Grade specified for applicable material category. Provide R 1980-C manufactured by Neenah Foundry or equal.

### **2.03 CONFIGURATION**

- A. Shaft Construction: Concentric with concentric cone top section; lipped male/female dry joints; sleeved to receive pipe sections.
- B. Shape: Cylindrical.
- C. Clear Inside Dimensions: 48 inch diameter.
- D. Design Depth: As indicated.
- E. Clear Lid Opening: As indicated.
- F. Pipe Entry: Provide openings as indicated.
- G. Steps: 9 inches wide, 16 inches on center vertically, set into manhole wall.
- H. Steps: As required by code.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify items provided by other sections of Work are properly sized and located.
- B. Verify that built-in items are in proper location, and ready for roughing into Work.



- C. Verify excavation for manholes is correct.

### **3.02 PREPARATION**

- A. Coordinate placement of inlet and outlet pipe or duct sleeves required by other sections.

### **3.03 MANHOLES**

- A. Place concrete base pad, trowel top surface level.
- B. Place manhole sections plumb and level, trim to correct elevations, anchor to base pad.
- C. Form and place manhole cylinder plumb and level, to correct dimensions and elevations. As work progresses, build in fabricated metal items.
- D. Cut and fit for pipe.
- E. Grout base of shaft sections to achieve slope to exit piping. Trowel smooth. Contour as required.
- F. Set cover frames and covers level without tipping, to correct elevations.
- G. Coordinate with other sections of work to provide correct size, shape, and location.

### **3.04 MASONRY WORK**

- A. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- B. Lay masonry units in running bond. Course one unit and one mortar joint to equal 8 inches.
- C. Form concave mortar joints.
- D. Lay masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- E. Install joint reinforcement 16 inches on center.
- F. Place joint reinforcement in first and second horizontal joints above base pad and below lid frame opening.

### **3.05 SCHEDULES**

- A. Storm Sewer Manholes: Precast concrete sections, galvanized steel steps, 48 inch inside dimension, to depth indicated, with bolted lid.

**END OF SECTION**

**SECTION 33 05 23.13**  
**HORIZONTAL DIRECTIONAL DRILLING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Work included: Furnish and install underground utilities using the horizontal directional drilling (HDD) method of installation of pipe, commonly referred to as directional boring or guided horizontal boring. This work includes all services, equipment, materials, and labor necessary for a complete and proper installation, testing, restoration of underground utilities, environmental protection and restoration.

**1.02 RELATED SECTIONS**

- A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions and Sections in Division 1 of these Specifications.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Certificates: Certify that products of this section meet or exceed specified requirements.
- C. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Newberry County Economic Development's name and registered with manufacturer.
- D. Product data: Within fifteen (15) calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
  - 1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
- E. Work plan: Prior to beginning work, Contractor must submit to the Engineer a work plan detailing the procedure and schedule to be used to execute the project. The work plan should be based on actual working conditions for this particular project and include the following:
  - 1. Description of all equipment to be used, down-hole tools, a list of personnel and their qualifications and experience, list of subcontractors, and a schedule of work activity.
  - 2. Safety plan.
  - 3. Traffic control plan (if applicable).
  - 4. Environmental protection plan.
  - 5. Contingency plans for possible problems.
- F. Equipment: Contractor will submit specifications on directional drilling equipment to be used to ensure that the equipment is adequate to complete the project. Equipment shall include, but not be limited to, the following:
  - 1. Drilling rig.
  - 2. Mud system.
  - 3. Mud motors (if applicable).
  - 4. Down hole tools.
  - 5. Guidance system.
  - 6. Rig safety systems.
  - 7. Calibration records for guidance equipment.
  - 8. Specifications for any drilling fluid additives that might be used.
- G. Material: Submit to Engineer specifications on any materials such as pipe, fittings or any other item to be an installed component of the project.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

- C. Requirements set forth in this document specify a wide range of procedural precautions necessary to ensure that the very basic, essential aspects of a proper directional bore installation are adequately controlled. Strict adherence is required under specifically covered conditions outlined in these specifications. Adherence to these specifications or the Engineer's approval of any aspect of any directional bore operation in no way relieves the Contractor of their ultimate responsibility for the satisfactory completion of the work authorized under the Contract.

## **1.05 DELIVERY, STORAGE, AND PROTECTION**

- A. Comply with pertinent provisions of Section 01600.

## **PART 2 PRODUCTS**

### **2.01 GENERAL**

- A. Directional drilling equipment to consist of the following:
  1. Directional drilling rig of sufficient capacity to perform the bore and pull-back the pipe.
  2. Drilling fluid mixing, delivery and recovery system of sufficient capacity to successfully complete the crossing.
  3. Drilling fluid recycling system to remove solids from the drilling fluid so that the fluid can be re-used.
  4. Guidance system to accurately guide boring operations.
  5. Vacuum truck of sufficient capacity to handle the drilling fluid volume.
  6. Trained and competent personnel to operate the system.
  7. All equipment shall be in good, safe operating condition with sufficient supplies, materials and spare parts on hand to maintain the system in good working order for the duration of this project.

### **2.02 DRILLING SYSTEM**

- A. Drilling rig:
  1. Hydraulically powered system to rotate, push and pull hollow drill pipe into the ground at a variable angle while delivering a pressurized fluid mixture to a guidable drill (bore) head.
    - a. Anchor the machine to the ground to withstand the pulling, pushing and rotating pressure required to complete the crossing.
    - b. Hydraulic power system to be self-contained with sufficient pressure and volume to power drilling operations and to be free of leaks.
  2. Rig to have a system to monitor and record maximum pull-back pressure during pull-back operations.
  3. Electrically ground the rig during drilling and pull-back operations.
- B. Construct drill pipe of high quality 4130 seamless tubing, Grade D, or better, with threaded box and pins. Toll joints should be hardened to 32-36 RC.

### **2.03 GUIDANCE SYSTEM**

- A. Provide a guidance system of a proven, accurate type with an interface meeting the following requirements:
  1. Must provide a continuous and accurate determination of the location of the drill head during the drilling operation.
  2. Must be capable of tracking at all depths up to 100' in any soil condition (including hard rock).
  3. Probe must provide immediate information on the tool face, azimuth (horizontal direction) and inclination (vertical direction) and must be accurate to  $\pm 2\%$  of the vertical depth of the bore hole at sensing position at depths up to 100' and accurate within 1.5 meters horizontally.
  4. System must be setup and operated by personnel trained and experienced. Operator must be aware of any geo-magnetic anomalies and must consider such influences in the operation of the guidance system if using a magnetic system.

## **2.04 DRILLING FLUID (MUD) SYSTEM**

- A. Mixing system:
  - 1. Provide self-contained, closed drilling fluid mixing system of sufficient size to mix and deliver drilling fluid composed of bentonite clay, potable water and appropriate additives.
  - 2. Mixing system must be able to molecularly shear individual bentonite particles from the dry powder to avoid clumping and ensure thorough mixing.
  - 3. System to continually agitate the drilling fluid during drilling operations.
- B. Fluids:
  - 1. Fluid to be composed of clean water, bentonite clay and approved additives.
  - 2. Use water from an authorized source with a pH of 8.5 - 10.
  - 3. Water of a lower pH or with excessive calcium to be treated with the appropriate amount of sodium carbonate, or equal.
  - 4. Mix water and bentonite clay thoroughly, absent of any clumps or clods.
  - 5. No additional material may be used in drilling fluid without prior approval from the Engineer.

## **2.05 OTHER EQUIPMENT**

- A. Pipe rollers:
  - 1. Provide pipe rollers of sufficient size to fully support the weight of the pipe while being hydro-tested and during pull-back operations.
  - 2. Provide a sufficient number of rollers to prevent excess sagging of pipe.
- B. Pipe rammers: Use hydraulic or pneumatic pipe rammers only if necessary and with the authorization of the Engineer.

## **2.06 FUSIBLE POLYVINYL CHLORIDE PRESSURE PIPE**

- A. Fusible polyvinyl chloride pipe shall conform to AWWA C900, AWWA C905, ASTM D2241, or ASTM D1785 for standard dimensions, as applicable. Testing shall be in accordance with the referenced AWWA standards for all pipe types.
- B. Fusible polyvinyl chloride pipe shall be extruded with plain ends. The ends shall be square to the pipe and free of any bevel or chamfer. There shall be no bell or gasket of any kind incorporated into the pipe.
- C. Fusible polyvinyl chloride pipe shall be manufactured in a standard 40' nominal length, or custom lengths as specified.
- D. Pipe shall be marked as follows:
  - 1. Nominal Pipe Size
  - 2. PVC
  - 3. Dimension Ratio, Standard Dimension Ratio, or Schedule
  - 4. AWWA Pressure Class, or standard pressure rating for non-AWWA pipe, as applicable
  - 5. AWWA standard designation number, or pipe type for non-AWWA pipe, as applicable
  - 6. Extrusion production-record code
  - 7. Trademark or trade name
  - 8. Cell Classification 12454 and/or PVC Material Code 1120 may also be included
- E. Pipe shall be homogenous throughout and be free of visible cracks, holes, foreign material, blisters, or other visible deleterious faults.

## **2.07 FUSION JOINTS**

- A. Unless otherwise specified, fusible polyvinylchloride pipe lengths shall be assembled in the field with butt-fused joints. The Contractor shall follow the pipe supplier's written guidelines for this procedure. All fusion joints shall be completed as described in this specification.

## **2.08 CONNECTIONS AND FITTINGS FOR PRESSURE APPLICATIONS**

- A. Connections shall be defined in conjunction with the coupling of project piping, as well as the tie-ins to other piping systems.
- B. **DUCTILE IRON MECHANICAL AND FLANGED FITTINGS**
  - Acceptable fittings for use with fusible polyvinyl chloride pipe shall include standard ductile iron fittings conforming to AWWA/ANSI C110/A21.10, or AWWA/ANSI C153/A21.53 and AWWA/ANSI C111/A21.11.
  - 1. Connections to fusible polyvinyl chloride pipe may be made using a restrained or non restrained retainer gland product for PVC pipe, as well as for MJ or flanged fittings.
  - 2. Bends, tees, and other ductile iron fittings shall be restrained with the use of thrust blocking or other means as indicated in the construction documents.
  - 3. Ductile iron fittings and glands must be installed per the manufacturer's guidelines.
- C. **PVC GASKETED, PUSH-ON FITTINGS**
  - Acceptable fittings for use with fusible polyvinyl chloride pipe shall include standard PVC pressure fittings conforming to AWWA C900 or AWWA C905.
  - 1. Acceptable fittings for use in joining fusible polyvinylchloride pipe to other sections of fusible polyvinylchloride pipe or other sections of PVC pipe shall include gasketed PVC, push-on type couplings and fittings, including bends, tees, and couplings as shown on the drawings.
  - 2. Bends, tees, and other PVC fittings shall be restrained with the use of thrust blocking or other restraint products as indicated in the construction documents.
  - 3. PVC gasketed, push-on fittings and mechanical restraints, if used, must be installed per the manufacturer's guidelines.
- D. **SLEEVE-TYPE COUPLINGS**
  - 1. Sleeve-type mechanical couplings shall be manufactured for use with PVC pressure pipe, and may be restrained or unrestrained as indicated in the construction documents.
  - 2. Sleeve-type couplings shall be rated at the same or greater pressure carrying capacity as the pipe itself.
- E. **CONNECTION HARDWARE**
  - 1. Bolts and nuts for buried service shall be made of non-corrosive, high-strength, low-alloy steel having the characteristics specified in ANSI/AWWA C111/A21.11, regardless of any other protective coating.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. The Engineer must be notified forty (48) hours in advance of starting work. Directional bore shall not begin until the Engineer's representative is present at the job site.

### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. All personnel shall be fully trained in their respective duties as part of the directional drilling crew and in safety.
- C. A competent and experienced supervisor representing the Contractor and drilling subcontractor shall be present at all times during the actual drilling operations.
- D. A responsible representative, thoroughly familiar with the equipment and type of work to be performed, must be in direct charge and control of the operation at all times.
- E. Supervisor must be continually present at the job site during the actual directional bore operation at all times.

- F. A sufficient number of competent workers must be provided at all times to ensure the directional bore is made in a timely and satisfactory manner.

### **3.03 DRILLING PROCEDURE**

- A. Site preparation:
  - 1. Contractor to provide photograph or video tape of the entire work area, including entry and exit points prior to any alterations to work site, including:
    - a. Provide Engineer with one copy of photograph or video tape.
    - b. One copy to remain with Contractor for a period of one year following the completion of the project.
- B. Drill path survey: Accurately survey the entire drill path with entry and exit stakes placed in the appropriate locations. If Contractor is using a magnetic guidance system, drill path will be surveyed for any surface geo-magnetic variations or anomalies.
- C. Environmental protection:
  - 1. Place silt fence between all drilling operations and any drainage, wetland, waterway or other area designated for such protection by contract documents, state, federal and local regulations.
  - 2. Install berms, liners, turbidity curtains and any other measures necessary to contain any hydraulic or drilling fluid spills for additional environmental protection.
  - 3. Adhere to all applicable environmental regulations.
  - 4. Do not store fuel in bulk containers within 20' of any water-body or wetland.
- D. Pipe: Weld/fuse pipe together in one length prior to placing in bore hole. Place pipe on rollers before pulling into bore hole. Space rollers close enough to prevent excessive sagging of pipe.
- E. Pilot hole:
  - 1. Drill pilot hole on bore path with no deviations greater than 5% of depth over a length of 100'. In the event that pilot does deviate from bore path more than 5% of depth in 100', the Engineer may require to pull-back and re-drill from the location along bore path before the deviation.
  - 2. In the event that a drilling fluid fracture, inadvertent returns, or returns loss, occurs during pilot hole drilling operations, cease drilling, wait at least 30 minutes, inject a quantity of drilling fluid with a viscosity exceeding 120 seconds as measured by a March funnel and then wait another 30 minutes. If mud fracture or returns loss continues, cease operations and notify Engineer.
- F. Pull-back:
  - 1. After successfully reaming bore hole to the required diameter, contractor will pull the pipe through the bore hole. In front of the pipe will be a swivel and barrel reamer to compact bore hole walls. Once pull-back operations have commenced, operations must continue without interruption until pipe is completely pulled into bore hole.
  - 2. Do not apply more than the maximum safe pipe pull pressure during pull-back operations.

### **3.04 SITE RESTORATION**

- A. De-mobilize equipment to restore the work site to original condition once drilling operations are terminated.
- B. Backfill and compact all excavation to 95% of original density.

### **3.05 RECORD KEEPING AND AS-BUILTS**

- A. Maintain a daily project log of drilling operations and a guidance system log with a copy given to Engineer at completion of project.
- B. A professional surveyor must complete and certify as-built drawings.

### **3.06 MEASUREMENT AND PAYMENT**

- A. Measurement will be horizontal length along the centerline of the utility from the beginning to the end of the drilling as indicated on the plans.

- B. Payment will be made at the price bid per linear foot and shall include all costs of mobilization, excavation, drilling operations, overhead, profit, insurance, pipe, expansion joints, safety, cleanup, restoration, testing, layout of work, drill path survey, record keeping, etc., for a complete installation.
- C. The cost of special pipe fittings for transitioning between different types of pipe shall be included in the unit price bid per linear foot for the horizontal directional drilling. No separate payment will be made for the fittings.

**END OF SECTION**

**SECTION 33 05 23.16  
JACK AND BORE CROSSINGS**

**PART 1 GENERAL**

**1.01 SCOPE**

The work covered in this section consists of furnishing all materials, labor, equipment, and other miscellaneous appurtenances necessary for the proper completion of pipeline crossings under roads, railroads, or creeks.

**1.02 SUBMITTALS**

Complete product data and engineering data, including shop drawings, shall be submitted to the Engineer in accordance with the requirements of Section 01 60 00 of the Contract Documents.

**1.03 RELATED SECTIONS**

- A. Section 33 05 40 Casing Pipes for Utilities

**PART 2 PRODUCTS**

**2.01 MATERIALS:**

Shall conform to requirements of **South Carolina Department of Transportation (SCDOT)** for crossings of State Highways or to the applicable railroad owner for railroad crossings if more stringent than the requirements specified within this section.

- A. Carrier Pipe:

1. Shall be ductile iron pipe, Pressure Class 350, of the size shown on the drawings.

- B. Casing Pipe:

1. Shall be steel pipe conforming to ASTM A-139, Grade B, electric fusion welded pipe having a minimum yield strength of 35,000 psi. The exterior of the casing pipe shall be coated with Kopper "Bitumastic Super Service Black", coal tar epoxy paint or equal. The size and wall thickness of the casing pipe for the indicated carrier pipe shall be as shown below:

<b>Carrier Pipe I.D.- (Nom.) Inches</b>	<b>Casing Pipe I.D.-(Nom.) Inches</b>	<b>Casing Pipe Wall Thickness (Inches)</b>
6	14	0.250
8	16	0.250
10	18	0.250
12	20	0.250
16	24	0.375
18	30	0.375
20	30	0.375
24	36	0.438
30	42	0.500



C. Casing Spacers:

Shall be Model CCS stainless steel casing spacers as manufactured by Cascade Waterworks Mfg. Co. of Yorkville, IL or approved equal.

## **PART 3 EXECUTION**

### **3.01 GENERAL**

Construction method shall conform to requirements of **SCDOT** for crossings of State Highways or to the applicable railroad owner for railroad crossings if more stringent than the requirements specified within this section.

### **3.02 JACKING PROCEDURES**

- A. The diameter of the excavation shall conform to the outside diameter and circumference of the pipe as closely as practicable. Any voids which develop during the installation operation and which are determined by the Engineer to be detrimental to the roadbed shall be pressure grouted with an approved mix.
- B. The distance that the excavation extends beyond the end of the pipe will depend upon the character of the excavated material, but shall not exceed 2 feet in any case.
- C. The pipe shall be jacked from the low or downstream end. Variation in the final position of the pipe from the line and grade established by the Engineer will be permitted if approved by the Engineer, providing that the final grade of flow line shall be in the direction indicated on the plans. Wood blocking to adjust the grade of the carrier pipe may be required.
- D. When jacking of pipe is once begun, the operation shall be carried on without interruption, insofar as practicable, to prevent the pipe from becoming firmly set in the embankment.
- E. Any pipe damaged in jacking operations shall be removed and replaced by the Contractor at his expense.
- F. Pressure pipeline carriers shall be adequately blocked with pressure treated wood to prevent movement in the casing pipe.
- G. Casing pipe shall be welded by a certified welder in accordance with AWS and AISC Standards. Welds shall be continuous, watertight and develop a greater strength than the pipe. Welds shall be chipped and wire brushed immediately before applying coal tar coating.
- H. The ends of the casing pipe shall contain end seals as well as brick and mortar to affect a watertight seal.
- I. Bores under Paved Driveways and Surface Obstructions: When driveways and other obstructions are encountered along the proposed waterline, the Contractor shall avoid damaging the area by boring under the driveways or other surface obstruction as called for on the plans.
- J. The type of bore shall be determined by its length and the soil conditions of the bore location. Bore diameter shall not exceed four (4) inches larger than that of the carrier pipe. When bore lengths exceed 25 L.F., a casing pipe shall be carried along with the bore. After the piping has been inserted through the casing, the casing shall be removed from the bore hole. When bore lengths are less than 25 L.F., the casing pipe will not be required to be used unless soil conditions will not permit an uncased bore.

- K. Casing spacers shall be placed not more than three (3) feet from each end of each joint of piping. Spacers shall be installed in strict accordance with manufacturer's recommendations.

### **3.03 BORING PROCEDURES**

- A. Holes are to be bored mechanically.
- B. The boring may be done using a pilot hole approximately 2-inches in diameter which shall be bored the entire length of the installation and shall be checked for line and grade on the opposite end of the bore. This pilot hole shall serve as the centerline of the larger diameter hole to be bored.
- C. The use of water or other fluids in connection with boring will be permitted only to the extent necessary to lubricate cuttings. Jetting will not be permitted.

### **3.04 MEASUREMENT AND PAYMENT**

- A. Measurement for Jack and Bore Crossings shall be based on the distance in linear feet as shown on the plans and/or as shown in the bid form. Payment shall be made to the nearest linear foot.

**END OF SECTION**

**SECTION 33 05 40  
CASING PIPES FOR UTILITIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Provide and install casing pipes under surface structures, where indicated, as specified herein, and as needed for a complete and proper installation.

**1.02 RELATED SECTIONS**

- A. Section 33 05 23.16 – Jack and Bore Crossings

**1.03 REFERENCES**

- A. FM P7825 - Approval Guide; Factory Mutual Research Corporation; current edition.
- B. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association; 2003.
- C. NFPA 70 - National Electrical Code; National Fire Protection Association; 2005.
- D. SSPC-Paint 15 - Steel Joist Shop Paint; Society for Protective Coatings; 1999 (Ed. 2004).

**1.04 SUBMITTALS**

- A. Product data: Within fifteen (15) calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
  - 1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
- B. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- C. Use equipment adequate in size, capacity, and numbers to accomplish the work in a timely manner.

**1.06 DELIVERY, STORAGE, AND PROTECTION**

- A. Deliver Material to project site.
- B. Store Material under cover and elevated above grade.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Cascade Manufacturing, Pipeline Seal and Insulator, Inc. or approved equal.

**2.02 MATERIALS**

- A. Casing Pipe for Dry Bores:

- 1. Steel complying with ASTM A139 for Grade B with minimum yield strength of 35,000 psi.
- 2. Provide ends suitable for field welding.
- 3. Minimum wall thickness as follows:

Diameter of Casing (Inches)	Minimum Wall Thickness (Inches)
14 and below	1/4 (0.250)
16-22	3/8 (0.375)
24-28	7/16 (0.438)
30-34	1/2 (0.500)
36-44	9/16 (0.563)
48-60	5/8 (0.625)

- B. Casing Pipe Spacers

- 1. For piping installed in casing provide pipeline casing spacers.
- 2. Provide a minimum of 1 spacer per ten linear feet of pipe for ductile iron pipe and a minimum of 1 spacer per six linear feet for PVC pipe.
- 3. Provide spacer with shell of 14 gauge T-304 stainless steel.
- 4. Provide shell liner of .090" thick PVC, 85-90 durometer.
- 5. Runners from 2" wide ultra-high molecular weight polymer with a high resistance to abrasion and a coefficient of friction of 0.11 -0.13 in accordance with ASTM D 1894.
- 6. Support runners on 14 gauge reinforced T-304 stainless steel risers welded to shell.
- 7. All metal surfaces to be fully passivated.
- 8. The diameter as measured over the runners shall exceed the pipeline bell or coupling outside diameter.
- 9. Provide pipeline casing spacers as manufactured by Cascade Manufacturing, Pipeline Seal and Insulator, Inc. or approved equal.

- C. End Seals
  - 1. Provide 1/8-inch thick rubber end seal at each end of the casing.
  - 2. Secure to casing and carrier pipe with T-304 stainless steel bands.
- D. Vent Pipe
  - 1. Provide 2-Inch steel pipe for venting to the surface, welded to the casing and sloped to provide positive drainage back to the casing.
    - a. For casing pipes less than 150-LF, provide vent pipe at end with higher elevation.
    - b. For casing pipes 150-LF and longer, provide vent pipe at both ends.
    - c. For casing pipes with less than 1% positive slope, provide vent pipe at both ends.
- E. Drain Pipe
  - 1. Provide 1-Inch steel pipe for drainage to the surface; welded to the casing at the downstream end of the pipe.
    - a. For casing pipes with less than 1% positive slope, provide drain pipe at both ends.

## **PART 3 EXECUTION**

### **3.01 ENTRY PITS**

- A. Locate to avoid interference with traffic, adjacent structures, etc., to such extent possible.
- B. Excavate to required depth, providing sheeting and shoring necessary for protection of the Work and for safety of personnel.
- C. Maintain in dry condition by use of pumps, drains or other approved method.

### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install casings by dry-boring through the casing while simultaneously jacking the casing.
- C. Any proposed alternate method shall be approved in writing by the Engineer.
- D. Weld joints to provide a watertight joint.
- E. Casings for gravity sanitary sewer, storm drainage or shown to be installed to grade, shall not vary more than 3/32" per foot of length from the indicated grade.
  - 1. Remove and replace any improperly installed or otherwise defective casing at no additional cost to the Owner.

### **3.03 INSTALLING PIPE IN CASING**

#### **A. General:**

1. Inspect carefully, insuring that all foreign material is removed from the casing and the casing meets alignment criteria for the type of carrier pipe being used.
2. For pressure systems, the casing deflection shall not exceed the maximum deflection recommended by the carrier pipe.
3. Install casing spacers on the carrier pipe per the manufacturer's instructions.
4. For sanitary and storm sewer provide spacer sizing and length necessary to obtain the pipe slope and elevations as shown on the plans.
5. Provide centered or restrained configuration.
6. Install the carrier pipe in the casing ensuring each joint is pushed "home" before the joint is installed into the casing.

### **3.04 INTERFACE WITH OTHER WORK**

- #### **A.**
- Verify that the installation of this part of the construction does not interfere with the pipe installation.

### **3.05 ERECTION TOLERANCES**

- #### **A.**
- Maximum Variation from true position: 4"-6" Deeper only.
- #### **B.**
- Maximum Offset from true alignment: 18"-24".

### **3.06 CASING ENDS**

- #### **A.**
- Install rubber end seals in accordance with manufacturer's instructions.

### **3.08 MEASUREMENT AND PAYMENT**

- #### **A.**
- Measurement for Casings shall be based on the distance in linear feet as shown on the plans and/or as shown in the bid form. Payment shall be made to the nearest linear foot. Payment includes casing, end seals, vents, drains, and or any appurtenances necessary.

**END OF SECTION**

**SECTION 33 11 00**  
**WATER DISTRIBUTION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Pipe and fittings for site water lines including domestic water lines and fire water lines.
- B. Valves, Fire hydrants, and Domestic water hydrants.

**1.02 RELATED REQUIREMENTS**

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete for thrust restraints.
- B. Section 31 23 16 - Excavation: Excavating of trenches.
- D. Section 31 23 16.13 - Trenching for Site Utilities: Excavating, bedding, and backfilling.
- D. Section 31 23 23.13 – Backfill and Compaction: Bedding and backfilling.
- E. Section 33 05 13 - Manholes and Covers.
- F. Section 33 13 00 - Disinfection of Water Distribution System: Disinfection of site service utility water piping.

**1.03 PRICE AND PAYMENT PROCEDURES**

- A. Pipe and Fittings: By the linear foot. Includes hand trimming excavation, pipe and fittings, bedding, concrete thrust restraints, connection to building service piping, and to municipal utility water source.
- B. Valves: By the unit. Includes valve, fittings and accessories.
- D. Hydrant: By the unit. Includes hand trimming excavation, gravel sump, hydrant, valve, connection, and accessories.

**1.04 REFERENCES**

- A. AASHTO HB - Standard Specifications for Highway Bridges; Seventeenth Edition.
- B. ASME B16.3 - Malleable Iron Threaded Fittings Classes 150 and 300; 2011.
- C. ASME B16.4 - Gray Iron Threaded Fittings Classes 125 and 250; 2011.
- D. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers; 2012 (ANSI B16.18).
- E. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; The American Society of Mechanical Engineers; 2013.
- F. ASME B18.2.2 - Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series); 2010.
- G. ASME B18.5.2.1M - Metric Round Head Short Square Neck Bolts; 2006 (Reaffirmed 2011).
- H. ASME B18.5.2.2M - Metric Round Head Square Neck Bolts; 1982 (Reaffirmed 2010).
- I. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- J. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2012.
- K. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts; 2007a.
- L. ASTM A563M - Standard Specification for Carbon and Alloy Steel Nuts [Metric]; 2007.
- M. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2009.
- N. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2012.
- O. ASTM D2241 - Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series); 2009.

- P. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40; 2013.
- Q. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings; 1996 (Reapproved 2010).
- R. ASTM D3035 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter; 2012.
- S. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals; 1998 (Reapproved 2011).
- T. AWS A5.8/A5.8M - Specification for Filler Metals for Brazing and Braze Welding; American Welding Society; 2011 and errata.
- U. AWWA C104/A21.4 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings; American Water Works Association; 2008 (ANSI/AWWA C104/A21.4).
- V. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; American Water Works Association; 2010 (ANSI/AWWA C105/A21.5).
- W. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; American Water Works Association; 2012 (ANSI/AWWA C111/A21.11).
- X. AWWA C115/A21.15 - Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges; 2011.
- Y. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast; American Water Works Association; 2009 (ANSI/AWWA C151/A21.51).
- Z. AWWA C200 - Steel Water Pipe, 6 In. (150 mm) and Larger; 2012 (ANSI/AWWA C200).
- AA. AWWA C203 - Coal-Tar Protective Coatings and Linings for Steel Water Pipelines - Enamel and Tape-Hot-Applied; 2008 (ANSI/AWWA C203).
- AB. AWWA C205 - Cement-Mortar Protective Lining and Coating for Steel Water Pipe, 4 in. (100 mm) and Larger - Shop Applied; 2012 (ANSI/AWWA C205).
- AC. AWWA C206 - Field Welding of Steel Water Pipe; 2011 (ANSI/AWWA C206).
- AD. AWWA C207 - Steel Pipe Flanges for Waterworks Service, Size 4 In. Through 144 In. (100 mm Through 3,600 mm); 2007 (ANSI/AWWA C205).
- AE. AWWA C208 - Dimensions for Fabricated Steel Water Pipe Fittings; 2012 (ANSI/AWWA C208).
- AF. AWWA C209 - Cold-Applied Tape Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines; 2006 (ANSI/AWWA C209).
- AG. AWWA C210 - Liquid-Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines; 2007 (ANSI/AWWA C210).
- AH. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service; American Water Works Association; 2009.
- AI. AWWA C502 - Dry Barrel Fire Hydrants; American Water Works Association; 2005 (ANSI/AWWA C502/C502a).
- AJ. AWWA C504 - Rubber Seated Butterfly Valves, 3 In. (75 mm) Through 72 In. (1,800 mm); American Water Works Association; 2010.
- AK. AWWA C508 - Swing-Check Valves for Waterworks Service, 2 In. (50 mm) Through 24 In. (600 mm) NPS; American Water Works Association; 2011 (ANSI/AWWA C508).
- AL. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service; American Water Works Association; 2009 (ANSI/AWWA C509).
- AM. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances; American Water Works Association; 2010 (ANSI/AWWA C600).
- AN. AWWA C602 - Cement-Mortar Lining of Water Pipelines in Place, 4 In. (100 mm) and Larger; 2011.



- AO. AWWA C606 - Grooved and Shouldered Joints; American Water Works Association; 2011.
- AP. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution; American Water Works Association; 2007 (ANSI/AWWA C900/C900a).
- AQ. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 1/2 In. (13 mm) Through 3 In. (76 mm), for Water Service; American Water Works Association; 2008.
- AR. AWWA M11 - Steel Pipe - A Guide For Design and Installation; 2004
- AS. UL 246 - Hydrants for Fire-Protection Service; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.
- AT. HDPE (4" through 63") conform to AWWA C906 latest Edition.

#### **1.05 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.
- B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

#### **1.06 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Project Record Documents: Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

#### **1.07 QUALITY ASSURANCE**

- A. Perform Work in accordance with utility company requirements.

#### **1.08 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver and store valves in shipping containers with labeling in place.

### **PART 2 PRODUCTS**

#### **2.01 OWNER-FURNISHED PRODUCTS**

- A. New Products: Refer to Newberry County Water and Sewer Authority SCDHEC approved Specifications.

#### **2.02 WATER PIPE**

- A. Manufacturers:
  - 1. Product: Refer to Newberry County Water and Sewer Authority SCDHEC approved Specifications.
  - 2. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Steel Pipe: Welded or Seamless complying with AWWA C200.
  - 1. Underground Pipe and Fittings: Cement-mortar lining and cement-mortar coating.
  - 2. Aboveground Pipe and Fittings: Cement-mortar lining.
  - 3. Fittings: AWWA C208.
    - a. Construct of same material as pipe with standard tube turns or segmentally welded sections to accommodate the type of couplings or joints provided.
    - b. Thickness Rating: Comply with not less than specified pipe thickness and calculated pipe pressure rating.
    - c. Mechanically or manually wrap, line, and coat all fittings with same protective materials and applications used for pipe.
  - 4. Minimum Wall Thickness: Refer to Newberry County Water and Sewer Authority SCDHEC approved Specifications.

5. Pipe manufacturer to calculate and determine wall thickness and fittings in the following manner:
  - a. Design Parameters:
    - 1) Pressure Rating: Refer to Newberry County Water and Sewer Authority SCDHEC approved Specifications.
    - 2) Earth Cover: Refer to Newberry County Water and Sewer Authority SCDHEC approved Specifications.
    - 3) Water Hammer: 40 percent of pressure rating.
    - 4) Live Load: H20 truck loading in accordance with AASHTO HB.
    - 5) Allowable Deflection: 2 percent of nominal pipe diameter.
    - 6) Modulus of Soil Reaction (E'): Refer to Newberry County Water and Sewer Authority SCDHEC approved Specifications.
  - b. Calculate pipe wall thickness on the basis of an allowable fiber stress in the steel equal to 50 percent of the minimum yield strength of the steel used in the manufacture of the pipe.
  - c. Comply with design procedures outlined in AWWA M11.
6. Joints:
  - a. Rubber Gasketed Bell and Spigot: Provide pipe manufacturer's standard design, meeting the requirements of AWWA C200.
  - b. Welded: Provide electrodes complying with AWWA C206.
  - c. Sleeve Type Mechanical Coupled:
    - 1) Designed to couple plain-end piping by compression of a ring gasket at each end of the adjoining pipe sections and provide for confinement and compression of gaskets.
    - 2) Coupling Assembly:
      - (a) One steel middle ring, flared or beveled at each end, providing a gasket seat and two steel or malleable iron follower rings, providing for confinement and compression of the gaskets.
      - (b) Provide middle ring and follower rings consisting of true, circular sections, free from irregularities, flat spots, and surface defects.
      - (c) Two resilient and tapered rubber gaskets, designed for resistance to set after installation.
      - (d) Bolts and nuts to draw the follower rings toward each other to compress the gaskets.
    - 3) Bolts: Track head conforming to ASTM A307, Grade A, with nuts conforming to ASTM A563 and ASTM A563M, Grade A.
    - 4) Coupling Strength: Not less than adjoining pipeline.
  - d. Grooved and Shouldered:
    - 1) Groove pipe ends by roll grooving or provide weld-on adapters with cut grooves.
    - 2) Groove dimensions by roll grooving as recommended by the coupling manufacturer.
    - 3) Dimensions of grooves cut in adapters to conform with AWWA C606.
    - 4) Comply with AWWA C606 for and shouldered pipe ends.
    - 5) Joint dimensions to comply with AWWA C606 for rigid joints and as indicated for flexible joints.
  - e. Flanged:
    - 1) Steel Flanges: AWWA C207, Class D.
    - 2) Bolts, Nuts, and Rubber Gaskets: AWWA C207.
    - 3) Asbestos gaskets not allowed.
  - f. Insulating Joints:
    - 1) Provide flanged type with insulating gasket, bolt sleeves, and washers to prevent metal-to-metal contact with adjacent piping.
    - 2) Gaskets: Dielectric type, full face, as recommended in Appendix to AWWA C115/A21.15.

- 3) Bolts and Nuts: As recommended in Appendix to AWWA C115/A21.15.
7. Lining and Coating:
    - a. Cement-Mortar Lining: AWWA C602, applied in-place.
    - b. Cement-Mortar Coating: AWWA C205, factory applied.
    - c. Coal-Tar Enamel Coating, factory applied:
      - 1) Except where indicated, prepare, prime, and coat piping with hot-applied coal-tar enamel and bonded single layer of felt wrap in accordance with AWWA C203.
      - 2) Asbestos felt not allowed.
      - 3) Felt Material: Fibrous-glass matt conforming to AWWA C203.
    - d. Coal-Tar Epoxy Coating, Shop Applied: Clean, prime, and topcoat piping with coal-tar epoxy coating system in accordance with AWWA C210.
  - C. Steel Pipe and Fittings:
    1. Pipe: Standard weight, zinc-coated complying with ASTM A53/A53M.
    2. Fittings: Comply with ASME B16.4, Class 125, zinc-coated or ASME B16.3, Class 150, zinc-coated, threaded.
    3. Mechanically Factory Applied Protective Materials:
      - a. Clean by wire brushing and solvent cleaning.
      - b. Apply one coat of coal-tar primer and two coats of coal-tar enamel conforming to AWWA C203.
      - c. Protect threaded pipe ends and fittings prior to coating.
  - D. Ductile Iron Pipe: AWWA C151:
    1. Fittings: Ductile iron, standard thickness.
    2. Joints: AWWA C111, rubber gasket with rods.
    3. Jackets: AWWA C105 polyethylene jacket.
  - E. Copper Tubing: ASTM B88, Type K, annealed:
    1. Fittings: ASME B16.18, cast copper, or ASME B16.22, wrought copper.
    2. Joints: Compression connection or AWS A5.8, BCuP silver braze.
  - F. PVC Pipe: ASTM D1785, Schedule 40.
    1. Fittings: ASTM D2466, PVC.
    2. Joints: ASTM D2855, solvent weld.
  - G. PVC Pipe: AWWA C900 Class 100:
    1. Fittings: AWWA C111, cast iron.
    2. Joints: ASTM D3139 compression gasket ring.
  - H. Polyethylene Pipe: ASTM D3035, for 45 psig pressure rating:
    1. Fittings: AWWA C901, molded or fabricated.
    2. Joints: Compression.
  - I. Polyethylene Pipe: AWWA C901:
    1. Joints: Compression.
  - J. Trace Wire: Magnetic detectable conductor, clear plastic covering, imprinted with " Water Service " in large letters.

### 2.03 VALVES

- A. Valves: Manufacturer's name and pressure rating marked on valve body.
- B. Gate Valves Up To 3 Inches:
  1. Brass or Bronze body, non-rising stem, inside screw, single wedge or disc, compression ends, with control rod, post indicator, valve key, and extension box.
  2. Product: Refer to Newberry County Water and Sewer Authority SCDHEC approved Specifications.
  3. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Gate Valves 3 Inches and Over:

1. AWWA C500, iron body, bronze trim, non-rising stem with square nut, single wedge, flanged ends, control rod, post indicator, valve key, and extension box.
  2. AWWA C509, iron body, bronze trim, non-rising stem with square nut, single wedge, resilient seat, flanged ends, control rod, post indicator, valve key, and extension box.
  3. Product: Refer to Newberry County Water and Sewer Authority SCDHEC approved Specifications.
  4. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Ball Valves Up To 2 Inches:
1. Brass body, teflon coated brass ball, rubber seats and stem seals, Tee stem pre-drilled for control rod, AWWA inlet end, compression outlet with electrical ground connector, with control rod, valve key, and extension box.
  2. Product: Refer to Newberry County Water and Sewer Authority SCDHEC approved Specifications.
  3. Substitutions: See Section 01 60 00 - Product Requirements.
- E. Swing Check Valves From 2 Inches to 24 Inches:
1. AWWA C508, iron body, bronze trim, 45 degree swing disc, renewable disc and seat, flanged ends.
  2. Product: Refer to Newberry County Water and Sewer Authority SCDHEC approved Specifications.
  3. Substitutions: See Section 01 60 00 - Product Requirements.
- F. Butterfly Valves From 2 Inches to 24 Inches:
1. AWWA C504, iron body, bronze disc, resilient replaceable seat, water or lug ends, ten position lever handle.
  2. Product: Refer to Newberry County Water and Sewer Authority SCDHEC approved Specifications.
  3. Substitutions: See Section 01 60 00 - Product Requirements.

#### **2.04 HYDRANTS**

- A. Hydrants: Type as required by utility company.
- B. Hydrants: AWWA C502, UL 246, dry barrel type.
1. Inside dimension: 7 inches minimum, with minimum 5 inches diameter valve seat opening.
  2. Minimum net water area of barrel not less than 190 percent of valve opening.
  3. 6 inch bell or mechanical joint inlet connection with accessories, gland bolts, and gaskets.
  4. Product: \_\_\_\_\_.
  5. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Hydrant Extensions: Fabricate in multiples of 6 inches with rod and coupling to increase barrel length.
- D. Hose and Streamer Connection: Match sizes with utility company, two hose nozzles, one pumper nozzle.
- E. Finish: Primer and two coats of enamel in color required by utility company.

#### **2.05 BEDDING AND COVER MATERIALS**

- A. Bedding: As specified in Section 31 23 16.13.
- B. Cover: As specified in Section 31 23 16.13.

#### **2.06 ACCESSORIES**

- A. Concrete for Thrust Restraints: Concrete type specified in Section 03300.
- B. Backflow Preventer: Refer to Newberry County Water and Sewer Authority SCDHEC approved Specifications.
- C. Meter: Refer to Newberry County Water and Sewer Authority SCDHEC approved Specifications.
- D. Manhole and Cover: Refer to Section 33 05 13.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that building service connection and municipal utility water main size, location, and invert are as indicated.

### **3.02 PREPARATION**

- A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare pipe connections to equipment with flanges or unions.

### **3.03 TRENCHING**

- A. See the sections on excavation and fill for additional requirements.
- B. Hand trim excavation for accurate placement of pipe to elevations indicated.
- C. Form and place concrete for pipe thrust restraints at each change of pipe direction. Place concrete to permit full access to pipe and pipe accessories. Provide thrust restraint bearing on subsoil. Refer to Newberry County Water and Sewer Authority SCDHEC approved Specifications.
- D. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

### **3.04 INSTALLATION - PIPE**

- A. Maintain separation of water main from sewer piping in accordance with SCDHEC approved code. Refer to Newberry County Water and Sewer Authority SCDHEC approved Specifications.
- B. Group piping with other site piping work whenever practical.
- C. Establish elevations of buried piping to ensure not less than three (3) ft of cover.
- D. Install pipe to indicated elevation to within tolerance of 5/8 inches.
- E. Install ductile iron piping and fittings to AWWA C600.
- F. Install grooved and shouldered pipe joints to AWWA C606.
- G. Route pipe in straight line.
- H. Install pipe to allow for expansion and contraction without stressing pipe or joints.
- I. Install access fittings to permit disinfection of water system performed under Section 33 13 00.
- J. Slope water pipe and position drains at low points.
- K. Install trace wire 6 inches above top of pipe; coordinate with Section 31 23 16.13.

### **3.05 INSTALLATION - STEEL PIPE**

- A. Make and assemble rubber-gasketed, bell-and-spigot joints in accordance with manufacturer's recommendations.
- B. Make welded joints in accordance with AWWA C206 and install in accordance with AWWA M11, Chapter 12, Transportation, Installation, and Testing.
- C. Assemble sleeve-type mechanical coupling joints in accordance with manufacturer's recommendations.
- D. Make flanged joints water-tight without undue strain on other material and equipment, using right-sized bolts, and parallel to adjoining flanges.
- E. Make grooved joints with equipment designed and produced by the manufacturer of grooved joint couplings and assemble in accordance with the coupling manufacturer's recommendations.
- F. Make shouldered type joints with the specified coupling, connect with shouldered ends, and assemble in accordance with the couplings manufacturer's recommendations.

- G. Make insulating joints with specified materials and assemble for flanged joints with bolts, with full size insulating sleeves for bolt holes, and no metal-to-metal contact with dissimilar metals after assembly.
- H. After installation, line piping in-place with cement mortar in accordance with AWWA C602.
- I. Finish joints on piping with cement-mortar lining in accordance with AWWA C205.
- J. Finish joints on piping with coal-tar enamel, coal-tar epoxy, or Newberry County Water and Sewer Authority approved coating by cleaning, priming, coating, and wrapping with cold-applied tape coating in accordance with AWWA C209. Refer to Newberry County Water and Sewer Authority SCDHEC approved Specifications.
- K. Maximum, allowable offsets for bell-and-spigot rubber-gasket joints, from a straight line or grade, as required by vertical curves, horizontal curves, or offsets, shall be five degrees or less in accordance with manufacturer's recommendations.
- L. Form short-radius curves and closures with short pipe lengths or specified, fabricated specials.

### **3.06 INSTALLATION - VALVES AND HYDRANTS**

- A. Set valves on solid bearing.
- B. Center and plumb valve box over valve. Set box cover flush with finished grade.
- C. Set hydrants plumb; locate pumper nozzle perpendicular to and facing roadway.
- D. Set hydrants to grade, with nozzles at least 20 inches above ground.
- E. Locate control valve 4 inches away from hydrant.
- F. Provide a drainage pit 36 inches square by 24 inches deep filled with 2 inches washed gravel. Encase elbow of hydrant in gravel to 6 inches above drain opening. Do not connect drain opening to sewer.
- G. Paint hydrants in accordance with Newberry County Water and Sewer Authority SCDHEC approved Specifications.

### **3.07 SERVICE CONNECTIONS**

- A. Provide water service to utility company requirements with reduced pressure backflow preventer and water meter with by-pass valves and sand strainer.
- B. Provide sleeve in retaining wall for service main. Support with reinforced concrete bridge. Calk enlarged sleeve watertight.
- C. Anchor service main to interior surface of foundation wall.
- D. Provide 18 gage galvanized sheet metal sleeve surrounding service main to 6 inches above floor and 6 feet minimum below grade. Size for 2 inches minimum of glass fiber insulation stuffing.

### **3.08 FIELD QUALITY CONTROL**

- A. Perform field inspection and testing in accordance with Section 01 40 00.
- B. Pressure test water piping to SCDHEC approved psi. Refer to Newberry County Water and Sewer Authority SCDHEC approved Specifications.
- C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

### **3.09 MEASUREMENT AND PAYMENT**

- A. Payment will be made at the unit price per "Linear Foot" as stated in the Bid Form for Water Distribution.

**END OF SECTION**

**SECTION 33 13 00**  
**DISINFECTION OF WATER DISTRIBUTION SYSTEM**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Disinfection of water lines specified in Section 33 11 00.
- B. Testing and reporting results.

**1.02 RELATED REQUIREMENTS**

- A. Section 33 11 00 - Water Distribution.

**1.03 PRICE AND PAYMENT PROCEDURES**

- A. Disinfection: By the linear foot. Includes preparing, disinfecting, testing, and reporting.

**1.04 REFERENCE STANDARDS**

- A. AWWA B300 - Hypochlorites; American Water Works Association; 2011 (ANSI/AWWA B300).
- B. AWWA B301 - Liquid Chlorine; American Water Works Association; 2010 (ANSI/AWWA B301).
- C. AWWA B302 - Ammonium Sulfate; American Water Works Association; 2010 (ANSI/AWWA B302).
- D. AWWA B303 - Sodium Chlorite; American Water Works Association; 2010.
- E. AWWA C651 - Disinfecting Water Mains; American Water Works Association; 2005 (ANSI/AWWA C651).

**1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Test Reports: Indicate results comparative to specified requirements.
- C. Certificate: From authority having jurisdiction indicating approval of water system.
- D. Certificate: Certify that cleanliness of water distribution system meets or exceeds specified requirements.
- E. Disinfection report:
  - 1. Type and form of disinfectant used.
  - 2. Date and time of disinfectant injection start and time of completion.
  - 3. Test locations.
  - 4. Initial and 24 hour disinfectant residuals (quantity in treated water) in ppm for each outlet tested.
  - 5. Date and time of flushing start and completion.
  - 6. Disinfectant residual after flushing in ppm for each outlet tested.
- F. Bacteriological report:
  - 1. Date issued, project name, and testing laboratory name, address, and telephone number.
  - 2. Time and date of water sample collection.
  - 3. Name of person collecting samples.
  - 4. Test locations.
  - 5. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.
  - 6. Coliform bacteria test results for each outlet tested.
  - 7. Certification that water conforms, or fails to conform, to bacterial standards of Newberry County Water and Sewer Authority. Refer to Newberry County Water and Sewer Authority SCDHEC approved Specifications.

**1.06 QUALITY ASSURANCE**

- A. Water Treatment Firm: Company specializing in disinfecting potable water systems specified in this Section with minimum three years documented experience.

- B. Testing Firm: Company specializing in testing potable water systems, certified by governing authorities of South Carolina.
- C. Submit bacteriologist's signature and authority associated with testing.

## **PART 2 PRODUCTS**

### **2.01 DISINFECTION CHEMICALS**

- A. Chemicals: AWWA B300, Hypochlorite, AWWA B301, Liquid Chlorine, AWWA B302, Ammonium Sulfate, and AWWA B303, Sodium Chlorite.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that piping system and water well has been cleaned, inspected, and pressure tested.
- B. Schedule disinfecting activity to coordinate with start-up, testing, adjusting and balancing, demonstration procedures, including related systems.

### **3.02 DISINFECTION**

- A. Use method prescribed by the applicable state or local codes, or health authority or water purveyor having jurisdiction, or in the absence of any of these follow AWWA C651.
- B. Provide and attach equipment required to perform the work.
- C. Inject treatment disinfectant into piping system.
- D. Maintain disinfectant in system for 24 hours.
- E. Flush, circulate, and clean until required cleanliness is achieved; use municipal domestic water.
- F. Replace permanent system devices removed for disinfection.
- G. Pressure test system to Newberry County Water and Sewer Authority required psi. Repair leaks and re-test. Refer to Newberry County Water and Sewer Authority SCDHEC approved Specifications.

### **3.03 FIELD QUALITY CONTROL**

- A. Perform field inspection and testing in accordance with Section 01 40 00.
- B. Test samples in accordance with AWWA C651.

**END OF SECTION**



**SECTION 33 30 00**  
**WASTEWATER: GRAVITY**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

- A. Work included: Provide Gravity wastewater system as indicated on the plans or as specified herein.
- B. Related work:
  - 1. Other documents affecting work under this section include but are not limited to the General Conditions, Supplementary Conditions, and sections in Division 1 of these specifications.
  - 2. Section 31 22 00 - Grading.
  - 3. Section 31 23 16 - Excavation.
  - 4. Section 31 23 16.13 - Trenching for Site Utilities.
  - 5. Section 31 23 23.13 – Backfill and Compaction
  - 6. Section 33 05 40 - Casing Pipes for Utilities.
  - 7. Section 32 92 00 - Grassing.

**1.02 QUALITY ASSURANCE**

- A. Perform work in accordance with utility company requirements.
  - 1. Use required number of workmen that are properly trained and have experience in the crafts and who are completely familiar with the specified requirements herein and the methods for the proper performance of the work specified in this section.
  - 2. All materials specified in this section must be manufactured in the United States of America and properly marked "Made in the USA".

**1.03 SUBMITTALS**

- A. Comply with Section 01 30 00.
- B. Contractor must provide product data within 14 calendar days after receipt of the Owner's notice to proceed.
- C. Submit specific items:
  - 1. Provide a Materials List for the specific items being provided under this Section.
  - 2. Specifications or other related data outlining compliance with the requirements of this section.

**1.04 PRODUCT HANDLING**

- A. Comply with Section 01 60 00.
- B. Storage of PVC pipe:
  - 1. PVC pipe must be stored as unit packages as received from the manufacturer prior to use.
  - 2. Pipe units must be staked to prevent deformation to pipe barrel and bells.
  - 3. If a storage period of more than six (6) weeks is required, protect pipe from direct sunlight by covering with opaque material.
- C. Protect PVC pipe from damage by severe impact blows, gouging or cutting by metal surfaces or rocks.

**1.05 ORDER AND ACCEPTANCE OF WORK**

- A. Contractor must confirm with the engineer regarding which gravity wastewater lines to install first and last.
  - 1. In general, gravity wastewater pipe installation will commence at the outfalls, installation of the wastewater mains and then the installation of any wastewater laterals.
- B. Owner and Engineer reserves right to accept and use any portion of the wastewater piping being installed if it is considered to be in the best interest of the public. Any required permitting to place the wastewater mains in operation will be secured by the Engineer and Owner.

## **1.06 PROTECTION OF OTHER UTILITIES**

- A. Location:
  - 1. The plans illustrate the approximate location of adjacent underground and above ground utilities that are known. Small service lines and or other utility lines are not illustrated and must be located prior to construction.
  - 2. Excavate, locate and expose any existing underground utilities prior to the proposed trenching.
- B. Repair and/or replace any damaged utility line or structure at no additional cost to the project and Owner.

## **1.07 CONFLICTING UTILITIES**

- A. Remove and/or relocate any conflicting utilities, as illustrated on the plans or when directed by the Engineer, at the expense of the Owner.
- B. When changes are made to the existing utilities and the plans indicate to avoid conflicts, the removal and/or relocation of these utilities may be made at no additional cost to the project or Owner.

## **1.08 JOB CONDITIONS**

- A. Work under this Section may require construction or work in a confined space, defined as any space having one or more of the following characteristics:
  - 1. Restricted openings for entry and exit.
  - 2. Poor natural ventilation.
  - 3. Areas may not be designed for occupancy over an extended period of time.
- B. In order to perform the work within the confined space areas, the Contractor shall at all times at least have on the job site the following safety equipment:
  - 1. Gas Monitoring Device that can test and detect combustible gas, oxygen deficiency and hydrogen sulfide.
  - 2. Confined Space access and rescue winch system.
  - 3. Vent Fan with large diameter vent hose.
  - 4. Supplied air respirator, MISHA/NIOSH approved type.
  - 5. Safety harness and lifelines.
- C. This required equipment must be made available for use by the Contractor, for his personnel, the Engineer and Owner if required, for the duration of the project.
- D. All entry into or work within confined spaces will be conducted in accordance with the U.S. Department of Health and Human Services/National Institute for Occupational Safety and Health [DHHS (NIOSH)] Publication No. 87-113, A Guide to Safety in Confined Spaces.

## **PART 2 - PRODUCTS**

### **2.01 GENERAL**

- A. All pipe provided for the project shall be observed by the Engineer at the manufacturing facility, within the trench or at any other point of delivery, for rejecting pipe that does not conform to specifications, and that is independent of laboratory testing.
- B. All rejected pipe will be marked by the Engineer for the Contractor's removal and disposal from project site.

### **2.02 PIPE AND FITTINGS**

- A. Any pipe material specified herein may be utilized for the wastewater system construction unless a particular pipe material is indicated on the plans.
- B. Ductile-Iron Pipe and Fittings (DIP):
  - 1. Provide piping in accordance with ASTM A-746 or ANSI A21.50 and A21.51 or AWWA C150 and C151, latest revision.
  - 2. All mechanical or push-on joints must comply with AWWA/ANSI C111/A21.11 and as modified by AWWA/ANSI C151/A21.51, latest revision.

3. Provide rubber gaskets and lubricant complying with AWWA/ANSI C111/A21.10, latest revision.
  4. Provide pipe size in accordance with table included herein for depth and bedding conditions.
  5. Provide fittings with pressure rating of 150 psi and in accordance with AWWA/ANSI C110/A21.10, latest revision.
  6. Provide a pipe lining in accordance with one (1) of the following:
    - a. Polyethylene lining complying with ASTM D1248, latest revision, with a 40 mil nominal thickness.
    - b. Amine cured Novalac Epoxy polymeric lining, 40 mils nominal thickness. The standards of quality are based on Protecto 401 by Vulcan Painters, Polymer Lining No. 210 by Seauereisen Cements.
- C. Polyvinyl Chloride Pipe and Fittings (PVC):
1. Provide integral wall bell and spigot, minimum of SDR35, complying with ASTM D3033 and D3034 or F-789-82; ASTM D2321, latest revision.
  2. Provide elastomeric gasket joints that provide a watertight seal.
  3. Provide pipe in 12.5 or 20-foot lengths.
- D. Polyethylene Encasement: (Optional)
1. Provide polyethylene encasement of pipe and fittings as illustrated on the plans or specified herein.
  2. The minimum nominal thickness for the encasement is eight (8) mil.
  3. All encasements must be provided in accordance with AWWA C105, latest revision.

### 2.03 MANHOLES

- A. Use precast manholes:
1. Provide reinforced precast concrete manhole ring and eccentric cone sections complying with ASTM C478, latest revision, at a minimum and the following:
  2. Portland cement must comply with ASTM C150, latest revision, Type II.
  3. Provide a Cast base slab monolithically with walls.
  4. For HS-20 traffic loading conditions provide a flat slab top section designed to meet the load requirements.
  5. Cast ladder rungs into the wall of all units.
    - a. Embed a minimum of 3" deep with a maximum spacing of 16".
  6. Manhole sections must be tongue and groove with vulcanized butyl rubber sealant or O-ring rubber gasketed joints.
  7. Provide cast or factory cut pipe opening in manholes:
    - a. Provide flexible pipe boot in accordance with ASTM C923M, latest revision.
    - b. Boot must be attached to the wastewater piping with a minimum of two (2) stainless steel straps.
    - c. Any other hardware provided must be stainless steel.
    - d. Provide Kor-N-Seal or equal where required.
  8. All lift holes and inserts must be sized to provide a precision fit with the lift devices used to move the manhole sections.
    - a. Lift holes can not penetrate through the manhole wall.
    - b. Grout lift holes when manhole has been installed.
    - c. Comply with OSHA Standard 1926.704, latest revision.
  9. Where manhole depth is less than 4'-0" flat slab tops must be provided.
  10. Provide a coal tar epoxy coating for the manhole: Use Tneme-Tar manufactured by Tneme or approved equal. (Optional manhole coating)
    - a. Interior 21 dry mils.
    - b. Exterior 7 dry mils.
    - c. Do not coat joints.
  11. Manhole Liner: (Optional liner for wetwells, manholes, etc...)

- a. Provide a High Density Polyethylene (HDPE) concrete protective liner (CPL) in the pump station wetwells, manholes that force mains connect as well as the next manhole downstream of force main receiving manhole, all air air release valve manholes and drop manholes.
- b. Minimum thickness: 2 mm.
- c. Provide extruded liner in sheets with a minimum 39 anchoring studs per sq. ft. that is manufactured during the extrusion process as one piece with the extruded liner sheet.
- d. Liner pull out design must meet 112.5/lbs/anchoring stud.
- e. Overlap all joints with flat liner sheet that is non-anchored and has a minimum thickness of 3 mm.
- f. All joints must be sealed by means of thermal welding performed by welders certified by the manufacturer.
- g. Provide sufficient elongation to accommodate up to 1/4" settling cracks.
- h. The lining must be repairable at any time during the life of the manhole structure.
- i. A manufacturer-certified fabricator must be utilized to custom fit the liner to the manhole formwork.
- j. All interior surfaces must be protected, including manhole walls, ceiling, pipe entries and manhole chimney.
- k. The liner and welding rods must be manufactured from the same resins meeting the following properties:
 

Property	Testing Method	Unit
Density	ASTM D792-86	0.945 g/cm <sup>3</sup>
MFI (Melt Flow Index)	ASTM D1238-88(190/5)	g/10 min.
Heat Reversion (Dimensional Stability)	ASTM D1638-83	<2%
Yield Stress	ASTM D638-89	>2,320 psi
Elongation of Yield	ASTM D638-89	>12%
Elongation of Break	ASTM D638-89	>200%
Fire Classification	UL-94	V2
Maximum Working Temperature		140 F
- l. Upon request provide written certification from the manufacturer, stating that the liner meets or exceeds the requirement of this specification.
- m. Accepted products: AgruSure Grip or approved equivalent.

B. Steps:

1. Provide polypropylene plastic steps reinforced with 3/8" diameter steel rod, M.S.A. Industries, Inc. Model PS-K, or equal.
2. Provide steps having non-skid top surfaces, safety slope at each end, minimum width of 10" and not less than 5" projection from wall.

C. Exterior joint collar: (Optional)

1. Provide exterior joint collar on all manhole joints with a 7" wide band.
  - a. Provide an outer layer of polyethylene with an under layer of rubberized mastic reinforced with a woven polypropylene fabric.
  - b. Provide a peelable protective paper against the mastic that is removed when the collar is applied to the joint.
  - c. Design the collar so that when it is applied around the joint the ends overlap at least 6".
  - d. Within the collar, locate two steel straps 5/8" wide 3/4" from each edge of the band.
  - e. Install the straps in tubes that isolate them from the mastic and allow them to slip freely when tightened around the pipe.
  - f. Design the collar so that when it is applied around the joint the ends overlap at least 6" and when the straps are secured a layer completely covers the straps protecting them from moisture and rust.
2. Approved manufacturers: SealWrap Exterior Joint Sealer as manufactured by Mar-Mac Manufacturing Company or an approved equal.

3. Approved manufacturers MacWrap Exterior Joint Sealer as manufactured by Mar-Mac Manufacturing Company or an approved equal.
- D. Frames and covers:
1. All gray iron castings must be provided in accordance with ASTM A48, latest revision, Class 30 iron.
  2. Machine all load bearing surfaces.
  3. Provide cover frames weighing not less than 195 lbs. with inside opening between 21" and 24".
  4. Provide circular cover with two (2) pick hole setup and weighing not less than 120 lbs.
  5. Covers must have the words "SANITARY SEWER" cast in the metal.
  6. Provide two (2) finished coats of bitumastic paint on all frames and covers.
  7. Watertight frames and covers with a minimum of four (4) bolts tapped and counter sunk in the cover, must be provided where indicated on the plans.
    - a. A rubber gasket must be provided between frame and cover.
  8. Provide manhole frame and cover from US Foundry Model No. USF 653, or approved equal.
- E. Precast grade rings: (Optional)
1. To adjust the finish grade of manhole covers, use precast Grade Rings.
  2. Grade Rings can not be used to extended manholes more than 8" vertical.
  3. Precast grade rings must conform to ASTM C478, latest revision.
  4. Provide grade rings with a minimum of 4" in height.
  5. Use cement bricks for cover adjustments less than 4".
- F. Precast inverts: (Optional)
1. Provide precast inverts on all precast manholes.
    - a. Pipe openings shall provide a minimum of 2" in clearance for pipe projecting the interior of the manhole.
    - b. The elevation change inside the manhole from the pipe opening to the invert trough shall be equal to one-half of the Opening ID minus Pipe ID,  $\pm 1/4$ ".
  2. The crown of small ID pipes must be equal to or greater than the crown of the outlet pipe.
    - a. When the fall between the inlet and the outlet pipes through the manhole is greater than 4", the invert of the trough must be below the inlet pipe invert and aligned horizontally within 1".
    - b. Provide troughs that have a consistent slope from the pipe outlet to the inlets up to 4" fall.
      - 1) The minimum fall through the manhole is 1".
      - 2) The minimum bending radius of the trough centerline-1.5 times the pipe ID
      - 3) When there are two (2) or more channels entering and exiting the manhole, provide a 1/2" radius at the intersection.
      - 4) Provide a minimum concrete thickness of 7" from the bottom of the trough to the bottom of the base.
    - c. Float-finish all benches to provide a uniform 2-1/2" slope,  $\pm 1$ ", from the highest point at the manhole wall to the low point at invert of trough.
      - 1) A 1/4" radius must be provided at the edge of the bench and trough.
    - d. Fill, depressions, high spots, voids, chips, or fractures over 1/4" in diameter or depth with a sand cement paste and finish to a texture reasonably consistent with the formed surface.

#### **2.04 CLEANOUTS (VERIFY WITH OWNER)**

- A. Provide cleanouts on each proposed service line.
  1. Locate cleanouts at the edge of the right-of-way.
- B. Cleanouts must be the same diameter as lines in which they are being installed. No wastewater service lines and cleanouts can be less than 4" in diameter.
- C. Provide Smith #4253, Josam #58860 with XH cast iron top, or approved equal.

- D. Provide ABS cleanout plugs.

## **2.05 OTHER MATERIALS**

- A. Provide any additional materials that may be required for a complete installation of the wastewater mains and service lines not specifically described but may be required for a complete and proper installation, as selected by the Contractor and approved by the Engineer.

## **PART 3 - EXECUTION**

### **3.01 LAYING OUT WORK**

- A. Provide all materials, labor, instruments, etc. required to lay out the proposed wastewater system and complete the installation.
- B. Cut sheets must be prepared under direct supervision of the Engineer.
- C. Contractor must verify all manhole invert calculations prior to the layout of the wastewater system, and the contractor will be held responsible for any errors that might have been avoided.
- D. Once errors have been determined, notify the Engineer immediately, in order that proper corrections may be made.

### **3.02 LOCATION OF WASTEWATER MAINS IN RELATION TO POTABLE WATER MAINS**

- A. Wastewater lines must conform to South Carolina Standards for Wastewater Facility Construction R.61-67 section 67-300 paragraph A.14.
- B. There shall be no physical connections between a public or private potable water supply system and a wastewater, or appurtenances thereto which may permit the passage of any sewage or polluted water into the potable supply. No. potable water pipe shall pass through or come into contact with any part of a wastewater manhole.
- C. In areas where the wastewater lines are not located clearly by dimensions on the drawings, locate the wastewater lines:
  - 1. Horizontal and Vertical Separation: Wastewater Mains shall be laid at least 10-feet horizontally from any existing or proposed potable water main or water service line. The distance shall be measured edge to edge. In cases where it is not practical to maintain a 10-foot separation, SCDHEC may allow deviation on a case-by-case basis, if supported by data from the design engineer. Such deviation may allow installation of the wastewater main closer to the potable water main, provided that the potable water main is in a separate trench or on an undisturbed earth shelf located on one side of the wastewater main and at an elevation so the bottom of the potable water main is at least 18-inches above the top of the wastewater main.
  - 2. Crossings: Wastewater mains crossing potable water mains shall be laid to provide a minimum vertical separation of 18-inches between the outside of the potable water main and the outside of the wastewater main. This shall be the case where the potable water main is either above or below the wastewater main. Where a new wastewater main crosses a new potable water main, a full length of pipe shall be used for both the wastewater main and the potable water main and the crossing shall be arranged so that the joint of each main shall be as far as possible from the point of crossing and each other. Where a potable water main crosses under a wastewater main, adequate structural support shall be provided for the wastewater main to prevent damage to the potable water main while maintaining line and grade as stated Paragraph 5 below.
  - 3. Special Conditions: When it is impossible to obtain the distances specified above, SCDHEC may allow an alternative design and any alternative shall:
    - a. maximize the distances between the wastewater mains and the potable water main and the joints of each;
    - b. use pipe materials which meet the requirements as specified in Regulation 61-58.4 (D)(1) for the wastewater main; and
    - c. allow enough distance to make repairs to one of the mains without damaging the other.

4. No potable water main shall pass through or come into contact with any part of a wastewater manhole.
5. In locations where the water main crosses under a wastewater main, fully encase the wastewater pipe for a distance of 10' on each side of the water line pipe or use an acceptable pressure pipe that has no joint closer than 3' horizontally from the crossing. The pressure pipe used must be tested to verify water tightness prior to backfilling.
6. In locations where concrete encasement is utilized, provide no less than a 4" thickness on all sides of the pipe, including pipe joint locations.

### 3.03 WASTEWATER PIPE INSTALLATION

- A. All wastewater mains shall be constructed with a minimum of 3-feet of cover, unless justified by the applicant and approved by SCDHEC (e.g., use of ductile iron pipe may have cover less than 3-feet).
- B. Complete all trenching, backfill and compaction for the work under this section in accordance with provisions outlined in Sections 31 23 16, 31 23 16.13, and 31 23 23.13 of these specifications and the following requirements:
  1. Maximum trench widths, depths and bedding methods.
    - a. Maximum trench width dimensions refer to the critical trench section of the pipe excavation.
    - b. Install all proposed wastewater lines in accordance with tables listed below for the proposed pipe sizes and how they relate to depths of cut and class of bedding.
    - c. In areas where the trenches are excavated beyond specified widths, or trench walls collapse, install wastewater lines in accordance with the next improved class of bedding with no additional cost to the project or Owner.
    - d. Any additional costs associated with any special bedding and tamping beyond normal conditions must be included in unit prices bid for gravity wastewater lines.
  2. Polyvinyl Chloride Pipe (SDR35):  
 PipeMax. TrenchPipeFlat BottomTypeTypeConcrete  
 SizeWidthClassTrench1 or 22\*Bedding  
 8"2'-2" -\*\* \*\*3030  
 \*Class B Bedding (Type 2) is to be placed to top of the wastewater pipe.  
 \*\*This Class of Bedding can not be used for the pipe material and size.
  3. Outlined below are the bedding and tamping requirements for the Classes A, B, C and D:
    - a. Class B (Type 1) Bedding - Shape bottom of trench to pipe 2" below bottom of pipe; install bedding to proper level by spreading and thoroughly tamping fine granulated moist earth and sand to conform accurately to a ¼ of the circumference of pipe barrel; provide suitable material if not available from trench excavation; install piping, backfill and hand tamp in thin layers to height ¾ of pipe diameter, using the same material as that used in the bedding; complete trench backfill in accordance with Sections 02315, 02316 and 02317.
      - 1) Trenches excavated to excessive depths shall be backfilled to the proposed grade with stone or gravel bedding at the Contractor's expense.
      - 2) Contractor should avoid disturbing the pipe grade, alignment, and pipe joints at all times during construction.
      - 3) If the contractor prefers, Class B (type 2) bedding may be used instead of Class B (Type 1) bedding.
      - 4) Complete trench backfill complying with Sections 31 23 16, 31 23 16.13, and 31 23 23.13.
    - b. Class B (Type 2) Bedding – Excavate 4" below pipe barrel the full width of trench (Critical Section); backfill to grade with compacted crushed stone in accordance with SCDOT Aggregate No. 5, except where PVC wastewater lines are used, SCDOT Aggregate No. 57 should be utilized as well as the following:

- 1) For piping other than PVC, place stone in six-inch layers to mid-point of pipe and compact by slicing with shovel.
  - 2) For PVC pipe, place stone (Aggregate No. 57) in six-inch layers to the top of the pipe, compacting by slicing with shovel.
  - 3) Complete trench backfill complying with Sections 31 23 16, 31 23 16.13, and 31 23 23.13.
- C. Drain stop:
1. Drain stops are to be installed along the proposed wastewater piping at 100' intervals when Class B (Type 2) and Class C (Types 1 and 2) beddings are utilized.
  2. Construct drain stop out of compacted soil 2' long.
  3. All water must be removed from excavation prior to the installation of any drain stops.
- D. Pipe Installation:
1. General:
    - a. All proposed piping must be protected during handling. Remove any debris from the inside of any piping being installed.
    - b. Install piping from the outfall upstream with the pipe spigot ends pointing in direction of flow.
    - c. Each section of wastewater pipe must be installed to the grade and lines as illustrated of the plans to provide a uniform invert.
    - d. Be sure that all piping installed is clear of any debris before installation.
    - e. Before joining pipes together, make sure that all surface are clean and dry.
    - f. Provide gasket lubricants as recommended by the pipe manufacturer.
    - g. All joints should be fit, joined and adjust as necessary to meet the required tightness.
    - h. Ductile-iron pipe:
      - 1) Provide Class D bedding limiting the maximum pipe size to 24" and Class to 52 at a depth of 14'.
      - 2) Install piping in accordance with AWWA C600, latest revision unless otherwise noted herein.
    - i. Polyvinyl chloride pipe:
      - 1) Provide Class B (Type 2) or better bedding shall be used for all PVC gravity wastewater lines.
      - 2) Install piping in accordance with ASTM D2321, latest revision, unless otherwise noted herein.
    - j. When defective pipe materials are noted, remove and replace with approved pipe materials at no additional cost to the project or Owner.

### 3.04 MANHOLE INSTALLATION

- A. Set the base of each manhole level so that all walls will be plumb and level.
- B. All manhole bells and spigots must be cleaned.
- C. Provide joint sealer or a ring gasket to all wall section(s) that are set firmly in place to provide watertight joints.
- D. Manhole steps must align in both the cone and riser section of the manhole.
- E. Connect pipe boots to piping utilizing dual stainless steel straps.
- F. Provide grout for all lift holes installing the grout from the outside. Use non-shrink grout.
- G. Liner installation:
  1. Install manhole liner in accordance with manufacturer's recommendations.
  2. Liner welding must be performed by welders certified by the manufacturer.
  3. Provide a one-piece monolithic concrete protective liner system once welded.
  4. The following are approved welding techniques:
    - a. Extrusion welding.
    - b. Wedge welding.
    - c. Butt welding.



- d. Hot air welding.
- 5. Testing and supervision of the installation and welding of the liner system must be checked and approved by qualified staff only by visually inspecting and by Spark Testing all welded joints.
- H. Install exterior joint collar.
  - 1. Install in accordance with manufacturer's recommendations.
  - 2. Only on a clean surface.
  - 3. The protective paper must be removed from the joint collar and the band placed around the manhole with the mastic side against the manhole and spanning the joint.
  - 4. The exposed strap must be covered with the closing flap.
  - 5. Secure the steel straps with only manufacturer's recommended tools. (optional)
- I. Form the invert channels directly in the concrete of the manhole base, with mortar, or by laying full section sewer pipe through the manhole and breaking out the top half after surrounding concrete has hardened. Smooth the floor of the manhole outside of the channels and slope toward the channels at not less than 1" per foot and no more than 2" per foot. (Only if precast inverts are not used)
- J. Install manhole tops using precast grade rings.
- K. Manhole top elevations shall be greater than or equal to the 50-year flood elevation, unless watertight covers are provided.

### **3.05 DROP MANHOLES**

- A. Place drop manholes where required on the plans and construct in accordance with the details illustrated on the wastewater detail sheet.
- B. Drop manholes are required where the invert differential is 24-inches or more.

### **3.06 CONNECTIONS TO EXISTING SYSTEM**

- A. When constructing a new manhole over an existing wastewater line, construct channels in base of new manhole leaving the existing wastewater line in operation then cut the upper half of existing pipe.
- B. When connecting to existing manholes, temporarily block and/or divert wastewater flows, and use high-early strength cement for mortar to form the proper channels within the existing manhole while keeping the existing manhole in operation or minimize any disruption in service.

### **3.07 INSTALLATION IN CASING PIPES**

- A. Install wastewater lines where indicated on the plans in casing pipe complying with Section 33 05 40 of these specifications.

### **3.10 INSPECTIONS AND TESTING**

- A. General:
  - 1. All wastewater lines will be visually inspected, tested and gauged for infiltration and/or exfiltration.
  - 2. Any visible leaks within the new wastewater system shall be repaired.
  - 3. Any broken, cracked or mislaid pipe must be corrected prior to testing and approval.
  - 4. All repairs to the new wastewater system shall be conducted at no additional cost to the project or Owner.
  - 5. Expense of all testing will be borne by the Contractor.
- B. Construction observation:
  - 1. As each section or blocks of wastewater lines are completed, clean and prepare for observation.
  - 2. Each section piping between new manholes shall show a full circle of light when viewed from either end.
- C. Deflection tests:
  - 1. Deflection tests are to be performed on all PVC pipes and in the presence of the Engineer.

2. Perform deflection testing once all final backfill, and compaction has been completed and in place for a period of twenty (20) days. Do not place the new wastewater system into operation before the permit to operate has been obtained.
  3. All deflection tests must be conduct using a rigid ball or mandrel that have a diameter equal to 95% of the inside diameter of the pipe.
  4. Mechanical pulling devices can not be utilized for the deflection tests.
  5. Any pipes tested that exceeds a deflection of 5% will need to exposed, observed and replaced.
- D. Infiltration tests:
1. Infiltration tests are to be provided using V-notch weir, or by direct measurement prior to allowing discharges in the wastewater line.
  2. Seal the end of the wastewater line at upstream structure to prevent the infiltration of water.
  3. If well points are being utilized to control groundwater, discontinue this operation for at least three (3) days prior to testing.
  4. All gravity wastewater mains shall be designed and specified such that the leakage outward (exfiltration) or inward (infiltration) shall not exceed 200-gallons per inch of pipe diameter per mile per day. Air test may be utilized in lieu of an infiltration/exfiltration test, if approved by SCDHEC. Air testing shall conform to ASTM F-1417 for PVC pipe and ASTM C828 for DIP and Concrete Pipe.
  5. All tests must be conducted in the presence of the Engineer, and provide at least five (5) days notice in advance of testing.
- E. Air testing:
1. Where wastewater lines are installed above the groundwater table, provide air testing in accordance with ASTM C828, latest revision for ductile iron and concrete pipe, and ASTM F1417 for PVC pipe.

### **3.11 MEASUREMENT AND PAYMENT**

- A. All work under completed under this Section will be measured and paid for as follows:
- B. Wastewater piping will be measured from center to center of manholes and payment will be made at the unit price per "linear foot" as stated in the Bid Form, and shall include cost of excavation, bedding, backfilling, cleanup, testing, etc.
- C. Manholes will be paid for at the unit price "each" as stated in the Bid Form, which shall include all costs of excavation, backfilling, materials, standard frame and cover, etc.
- D. Concrete encasement will be paid for at the unit price per "linear foot" of concrete as stated in the Bid Form, such price to be paid in addition to the price per linear foot of wastewater pipe. The unit price stated in the Bid Form shall include the costs for any additional depth of excavation, the furnishing of concrete blocking, and the laying of pipe to line and grade on the blocking.

**END OF SECTION**

**SECTION 33 41 00**  
**STORM DRAINAGE PIPING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Storm drainage piping, fittings, and accessories.
- C. Drop Inlets, Site surface drainage, Detention outlet structure, and Detention basin.

**1.02 RELATED REQUIREMENTS**

- A. Section 03 30 00 – Cast-in-Place Concrete
- B. Section 31 23 16 – Excavation
- C. Section 31 23 16.13 – Trenching for Site Utilities
- D. Section 31 23 23.13 – Backfill and Compaction

**1.03 DEFINITIONS**

- A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

**1.04 REFERENCE STANDARDS**

- A. AASHTO M 36 - Standard Specification for Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains; American Association of State Highway and Transportation Officials; 2003.
- B. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings; 2013a.
- C. ASTM C12 - Standard Practice for Installing Vitrified Clay Pipe Lines; 2013.
- D. ASTM C14 - Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe; 2011.
- E. ASTM C14M - Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe [Metric]; 2011.
- F. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe; 2013a.
- G. ASTM C76M - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe [Metric]; 2013a.
- H. ASTM C425 - Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings; 2004 (Reapproved 2009).
- I. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets; 2012.
- J. ASTM C443M - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric); 2011.
- K. ASTM C700 - Standard Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated; 2011.
- L. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2012.
- M. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications; 2011.
- N. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2011.
- O. ASTM D2751 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings; 2005.
- P. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2008.

## **1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating pipe, pipe accessories, and pipe class.
- C. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Project Record Documents:
  - 1. Record location of pipe runs, connections, catch basins, cleanouts, and invert elevations.
  - 2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

## **1.06 REGULATORY REQUIREMENTS**

- A. Conform to applicable code for materials and installation of the Work of this section.

## **PART 2 PRODUCTS**

### **2.01 PIPE MATERIALS**

- A. Concrete Pipe: Reinforced, ASTM C 76 (ASTM C 76M), Class III with Wall Type A; mesh, Tongue and Groove end joints.
- B. Furnish pipe with joints designed for flexible watertight gaskets.
- C. Reinforced Concrete Pipe Joint Device: ASTM C443 (ASTM C443M) rubber compression gasket joint.

### **2.02 CATCH BASIN, TRENCH DRAIN, CLEANOUT, AND AREA DRAIN COMPONENTS**

- A. Precast drop inlets, catch basins, outlet structures, etc. shall be as manufactured by Tindall Concrete Products, Inc. or equal units by others.
- B. All other precast structures (i.e., headwalls, flared end sections, etc.) shall be approved by Engineer prior to installation.
- C. Use precast manholes:
  - 1. Provide reinforced precast concrete ring and eccentric cone sections complying with ASTM C-478 and the following.
  - 2. Use portland cement complying with ASTM C-150, Type II.
  - 3. Cast ladder rungs into the units.
  - 4. Provide tongue and groove or o-ring rubber gasketed joints.
  - 5. Use vulcanized butyl rubber sealant with tongue and groove joints.
  - 6. Provide flat slab tops where manhole depth is less than 4'0".
- D. Steps:
  - 1. Use aluminum or plastic steps.
  - 2. Provide steps having non-skid top surfaces, safety stops at each end, minimum width of 10" and not less than 5" projection from wall.
  - 3. Aluminum steps shall support 1000-pound load at center with no deformation, coat embedded ends with bituminous paint.
  - 4. Provide polypropylene plastic steps reinforced with 3/8" diameter steel rod, M.S.A. Industries, Inc. Model PS-K, or equal.
- E. Frames and covers:
  - 1. Provide gray iron castings, complying with ASTM A 48, Class 30 iron.
  - 2. Machine all bearing surfaces.
  - 3. Provide frames weighing not less than 195 lbs. with inside opening between 21" and 24".
  - 4. Provide circular cover with two "pick" holes and weighing not less than 120 lbs.
  - 5. Covers to have the words "STORM SEWER" cast in the metal.
  - 6. Coat frames and covers with two (2) shop coats of bitumastic paint.
  - 7. Provide watertight covers, where indicated, conforming to above requirements and with frame tapped for four bolts, countersunk in cover.

- a. Provide rubber gasket between frame and cover.

### **2.03 BEDDING AND COVER MATERIALS**

- A. Bedding: As specified in Section 31 23 16.13.
- B. Cover: As specified in Section 31 23 16.13.

### **2.04 OTHER MATERIALS**

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

## **PART 3 EXECUTION**

### **3.01 TRENCHING**

- A. See Section 31 23 16.13 for additional requirements.
- B. Hand trim excavation for accurate placement of pipe to elevations indicated.
- C. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

### **3.02 INSTALLATION - PIPE**

- A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on layout drawings.
- B. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal watertight.
  - 1. Plastic Pipe: Also comply with ASTM D2321.
- C. Lay pipe to slope gradients noted on layout drawings; with maximum variation from true slope of 1/8 inch in 10 feet.
- D. Connect to building storm drainage system, foundation drainage system, and utility/municipal sewer system.
- E. Make connections through walls through sleeved openings, where provided.
- F. Connect to building collection pits, through installed sleeves.

### **3.03 INSTALLATION - CATCH BASINS, TRENCH DRAINS AND CLEANOUTS**

- A. Form bottom of excavation clean and smooth to correct elevation.
- B. Form and place cast-in-place concrete base pad, with provision for sanitary sewer pipe end sections.
- C. Level top surface of base pad; sleeve concrete shaft sections to receive storm sewer pipe sections.
- D. Establish elevations and pipe inverts for inlets and outlets as indicated.
- E. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

### **3.04 FIELD QUALITY CONTROL**

- A. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

### **3.05 PROTECTION**

- A. Protect pipe and bedding cover from damage or displacement until backfilling operation is in progress.

### **3.06 MEASUREMENT AND PAYMENT**

- A. Payment will be made at the unit price per "each" item for structures and per "linear foot" for piping as stated in the Bid Form for Storm Drainage piping.

**END OF SECTION**