COLLETON COUNTY
SOUTH CAROLINA

**Purchasing Department**
**113 Mable T. Willis Blvd.**
**Walterboro, SC 29488**
**843.782.0504**

# BID: CC-41
# NORTHWEST WALTERBORO SEWER IMPROVEMENTS
# PHASE I GRAVITY SEWER

## Due: Thursday, March 13, 2025 @ 3:00 pm

All questions are to be submitted to Ross Oakley, P.E. at oakley.r@tandh.com no later than 11:00am on Thursday, February 27, 2025.

MAIL YOUR RESPONSE TO:

Colleton County
Bid: CC-41
Attn: Kaye B Syfrett
113 Mable T. Willis Blvd.
Walterboro, SC 29488

THOMAS & HUTTON

# CONTRACT DOCUMENTS AND TECHNICAL SPECIFICATIONS

## FOR

# NORTHWEST WALTERBORO SEWER IMPROVEMENTS PHASE I GRAVITY SEWER

PREPARED FOR:

COLLETON COUNTY, SOUTH CAROLINA

**J – #29830.0001**

**SCIIP GRANT NO. A23-E203**

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 29061 ROSS S. OAKLEY

SOUTH CAROLINA THOMAS & HUTTON ENGINEERING CO. No. C00285 CERTIFICATE OF AUTHORIZATION

12/23/24

DECEMBER 2024

thomasandhutton.com

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## INVITATION TO BID

## Legal Notice

1. Sealed proposals for Northwest Walterboro Sewer Improvements Phase I Gravity Sewer owned by Colleton County will be received by Colleton County at 113 Mable T Willis Blvd, Walterboro, SC 29488 until **3:00 P.M. March 13, 2025,** at which time they will be publicly opened.

2. The project consists of the following generally described work: approximately 11,800 linear feet of 18" PVC gravity sewer, 2,000 linear feet of 21" PVC gravity sewer, and 50 manholes.

   The project with also contain bid alternates consisting of approximately 23,000 linear feet of 10" force main and a 700 gallon per minute pump station.

3. Plans and Specifications are open to inspection at 113 Mable T Willis Blvd, Walterboro, SC 29488 or may be obtained from Thomas & Hutton Engineering Co., 9705 Hwy 78, Suite 103, Ladsen, SC 29456 upon payment of $200 (plus shipping charges as applicable). The payment is non–refundable. Electronic copies will be available upon request from Ross Oakley, P.E. at oakley.r@tandh.com or Kaye Syfrett at ksyfrett@colletoncounty.org.

4. Bids shall be accompanied by a bid bond or certified cashier's check in an amount not less than 10% of the base bid. All bonds shall be by a surety company licensed in South Carolina with an "A" minimum rating of performance and a financial strength of at least five times the contract price as listed in the most current publication of "Best's Key Rating Guide Property Liability." Performance and Payment Bonds, each in an amount equal to 100% of the contract price shall be required of the successful bidder if contract is awarded. Each Bond shall be accompanied by a "Power of Attorney" authorizing the attorney–in–fact to bind the surety and certified to include the date of the bond.

5. This project is being funded in whole or in part by the South Carolina Infrastructure Investment Program (SCIIP). All federal SCIIP requirements will apply to the contract. All contractors and subcontractors are required to be registered in the federal System for Award Management (SAM). Bidders on this work will be required to comply with the title VI if the Civil Rights Act of 1964; Fair Housing Act, Title VIII of the Civil Rights Act of 1968; Section 504 of the Rehabilitation Act of 1973, as amended; Age Discrimination Act of 1975, as amended; Title II of the Americans with Disability Act of 1990, as amended; and Contract Work Hours and Safety Standards Act.

6. SCIIP funds may not go to individuals or entities that are prohibited from doing business with the federal government. Entities registered in SAM will have a Unique Entity Identifier (UEI). Debarment status should be checked using the SAM website at https://www.sam.gov.

7. Owner reserves the right to reject any or all Bids, including without limitation, the rights to reject any or all nonconforming, nonresponsive, unbalanced or conditional Bids and to reject the Bid of any Bidder if Owner believes it would not be in the best interest of the Project to make an award to Bidder, whether because the Bid is not responsive or the

Bidder is unqualified or of doubtful financial ability or fails to meet any other pertinent standard or criteria established by the Owner.

8. In the event a prospective Bidder elects to not submit a Bid, it is respectfully requested that written notification of a **"No Bid"** be provided to the Engineer in advance of the Bid opening

9. A Virtual **Non-Mandatory** Pre–Bid Conference will be held, an invite will be sent with addendum containing date and time. All prospective bidders are encouraged to attend.

Colleton County

END OF INVITATION TO BID

# "NO BID" FORM

Project Title: Northwest Walterboro Sewer Improvements - Phase I Gravity Sewer

Owner: Colleton County / City of Walterboro

Project No: SCIIP#A-23-E203

Bid Opening: Date, time
Place
Address

Thank you for the opportunity to bid on this project; however, our company will not participate at this time and return this "no bid" form for your records.

Company:

Contact:

Signature:

Date:

Please email to oakley.r@tandh.com prior to the bid opening.

# DOCUMENT 00 21 13

# INSTRUCTIONS TO BIDDERS

**INTENTION**: It is intended the Instructions to Bidders, General Conditions, Supplementary Conditions, Technical Specifications and Construction Drawings shall cover the complete work to which they relate.

**ARTICLE 1** **DEFINED TERMS**: In addition to the terms defined in the General Conditions, Section 00 72 43, (EJCDC C–700)(2018), additional terms used in these Instructions to Bidders have the meanings indicated below which are applicable to both the singular and plural thereof.

1.1. **Bidder** – One who submits a Bid directly to Owner as distinct from a sub–bidder, who submits a bid to a Bidder.

1.2. **Successful Bidder** – The lowest, responsible, and responsive Bidder to whom Owner (based on Owner's evaluation as hereinafter provided) makes an award.

1.3. **Bid** – A complete and properly signed offer to execute work for the prices stipulated in Bid Form and submitted in accordance with the Bidding Documents.

1.4. **Addenda** – Graphic or written documents issued by Engineer prior to the opening of Bids issued to clarify, revise, add to, or delete information in the original bidding documents or in previous addenda.

**ARTICLE 2** **BID FORM**: All Bids must be made upon the Bid Forms hereto annexed, and shall state the amount bid for each item shown, and all bids must be for materials and work called for in the specifications. **Deposits for plans and specifications are not refundable.**

2.1 The Bid Form is included with the Bidding Documents; additional copies may be obtained from Engineer.

2.2 All blanks on the Bid Form must be completed by printing in black ink or by typewriter.

2.3 Bids by corporations must be executed in the corporate name by the president or a vice–president (or other corporate officer accompanied by evidence of authority to sign) and the corporate seal must be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation must be shown below the signature.

2.4 All names must be typed or printed in black ink below the signature.

2.5 The Bid shall contain an acknowledgment of receipt of all Addenda (the numbers of which must be filled in on the Bid Form.)

2.6 The address and telephone number for communications regarding the Bid must be shown.

**ARTICLE 3 QUALIFICATIONS OF BIDDERS:**

3.1 To demonstrate qualifications to perform the Work, each Bidder must be prepared to submit within five days after Bid opening upon Owner's request detailed written evidence such as financial data, previous experience, present commitments, and other such data as may be necessary to assist Owner in determining Contractor's qualifications.

3.2 Each Bid must contain evidence of Contractor's authority to conduct business in the state where the Work is to be performed. State Contractor license number, if applicable, must also be shown on the Bid Form.

**ARTICLE 4 COPIES OF BIDDING DOCUMENTS:**

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

4.2 Owner and Engineer in making copies of Bidding Documents available for a non–refundable deposit 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 5 EXAMINATION OF BIDDING DOCUMENTS, OTHER DATA, AND SITE:**

5.1 It is the responsibility of each Bidder before submitting a bid:

5.1.1 To examine and study thoroughly the Bidding Documents and other related data identified in the Bidding Documents;

5.1.2 To visit the work site to ascertain by inspection pertinent local conditions such as location, character and accessibility of the site including existing surface and subsurface conditions in the work area; availability of facilities, location and character of existing work within or adjacent thereto, labor conditions, etc.

5.1.3 To become familiar with and satisfy Bidder as to all federal, state, and local Laws and Regulations that may affect cost, progress, or performance of the Work;

5.1.4 To obtain and carefully study (or assume responsibility for doing so) all addition or supplementary examination investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, an Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance or the Work or which relate any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including any specific means, methods, techniques, sequences, and procedures of construction expressly

required of the bidding documents, and safety precautions and programs incident thereto;

5.1.5 To study and carefully correlate Bidder's knowledge and observations with the Bidding Documents and such other related data; and

5.1.6 To promptly notify Engineer of all conflicts, errors, ambiguities or discrepancies which Bidder has discovered in or between the Bidding Documents and such other related documents;

5.1.7 To agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies or data are necessary for the determination of its Bid for performance of the Work at the price bid and within the times and in accordance with the other terms and conditions of the Bidding Documents;

5.1.8 To 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;

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

5.2 The Owner shall make available to all prospective bidders, previous to receipt of bids, information that it may have as to sub–soil conditions and surface topography at the work site. Such information shall be given as the best factual information available without being considered as a representation of the Owner.

5.3 The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 5, that without exception, the Bid is premised upon performing and furnishing the Work required by the Bidding Documents and applying any specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by the Bidding Documents, that Bidder has given ENGINEER written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has discovered in the Bidding Documents and the written resolutions thereof by ENGINEER are acceptable to Bidder, and that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

**ARTICLE 6** **NON-MANDITORY PRE–BID CONFERENCE:** A Virtual Non-Mandatory Pre–Bid conference will be held, an invitation will be sent to all prospective Bidders with addendum containing date and time. Representatives of OWNER and ENGINEER will be present to discuss the Project. Bidders are encouraged to attend and participate in the conference. ENGINEER will transmit to all prospective Bidders of record such Addenda as ENGINEER considers necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be binding or legally effective.

**ARTICLE 7 INTERPRETATIONS AND ADDENDA:**

7.1 All questions about the meaning or intent of the Bidding Documents are to be directed to Engineer. The person submitting the request shall do so in writing and be responsible for its prompt delivery. 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, all addenda will also be posted on the Colleton County web page. Questions deadline will be **February 27, 0225 at 11 AM**, any questions received after this time may not be answered. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

7.2 Addenda may also be issued to modify the Bidding Documents as deemed advisable by Owner or Engineer.

**ARTICLE 8 BID SECURITY:**

8.1 Each Bid must be accompanied by Bid security made payable to Owner in an amount of ten percent of Bidder's maximum Bid price and in the form of a certified or bank check or a Bid Bond (on form attached, if a form is prescribed) issued by a surety company licensed in ***South Carolina*** with an "A" minimum rating of performance and a financial strength of at least five times the contract price as listed in the most current publication of "Best's Key Rating Guide Property Liability."

8.2 The Bid security of Successful Bidder will be retained until such Bidder has executed the Agreement, 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 Agreement and furnish the required contract security within fifteen 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 the seventh day after the Effective Date of the Agreement or the sixty–first day after the Bid opening, whereupon Bid security furnished by such bidders will be returned. Bid security with Bids that are not competitive will be returned within seven days after the Bid opening.

**ARTICLE 9 CONTRACT COMPLETION TIME:** The number of days within which, or by which the Work is to be (a) Substantially Completed and (b) also completed and ready for final payment are set forth in the Agreement. Provisions for liquidated damages, if any, are set forth in the Agreement.

**ARTICLE 10 SUBSTITUTE AND "OR–EQUAL" ITEMS:**

10.1 The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration of possible substitute or "or–equal" items. Whenever it is specified or

described in the Bidding Documents that a substitute or "or–equal" item of material or equipment may be furnished or used by CONTRACTOR if acceptable to ENGINEER, application for such acceptance will not be considered by ENGINEER until after the Effective Date of the Agreement. The procedure for submission of any such application by CONTRACTOR and consideration by ENGINEER is set forth in the General Conditions and may be supplemented in the General Requirements.

**ARTICLE 11 SUBCONTRACTORS, SUPPLIERS, AND OTHERS:**

11.1 Each bid must be accompanied by a list of 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 OWNER or ENGINEER, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, OWNER or ENGINEER may, before the Notice of Award is given, request apparent Successful Bidder to submit a substitute without an increase in the Bid.

11.2 If apparent Successful Bidder declines to make any such substitution, OWNER may award the Contact to the next lowest Bidder proposing 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.

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

**ARTICLE 12 SUBMITTAL OF BIDS:** Bids shall be submitted at the time and place indicated in the Invitation to Bid and shall be enclosed in a sealed opaque envelope, marked with the project title, and name and address of Bidder, and accompanied by the Bid security and other required documents. If the Bid is sent through the mail or other delivery system, the sealed envelope shall be enclosed in a separate envelope with the notation "BID ENCLOSED" on the face of it. Contractor license number(s) shall be written on the face of the bid envelope.

Each Bidder is responsible for seeing their Bid is received by the Owner not later than the advertised time set for the opening of Bids.

**ARTICLE 13 MODIFICATION AND WITHDRAWAL OF BIDS**:

13.1 Bids may be modified or withdrawn by an appropriate document duly executed (in the manner a Bid must be executed) and delivered to the

place where Bids are to be submitted at any time prior to the opening of bids.

13.2 If, within twenty–four 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 there was a material and substantial mistake in the preparation of its Bid, Bidder may withdraw its Bid and the Bid security will be returned. Thereafter, Bidder will be disqualified from further bidding on the Work to be provided.

**ARTICLE 14 OPENING OF BIDS:** Bids will be opened and (unless obviously non–responsive) read aloud publicly at the place where Bids are to be submitted. An abstract of the amount of the base Bids and major alternates (if any) will be made available to Bidders after the opening of Bids.

**ARTICLE 15 ACCEPTANCE OF BIDS:** Bids may not be withdrawn (except as noted in Paragraph 13) after the time set for the opening of Bids. Bids will remain subject to acceptance for 90 days after the day of the Bid opening, but the Owner may, in its sole discretion, release any Bid and return the Bid security prior to expiration of the acceptance period.

**ARTICLE 16 AWARD OF CONTRACT:**

16.1 Owner reserves the right to reject any or all Bids, including without limitation, the rights to reject any or all nonconforming, nonresponsive, unbalanced or conditional Bids and to reject the Bid of any Bidder if Owner believes it would not be in the best interest of the Project to make an award to a Bidder, whether because the Bid is not responsive, or the Bidder is unqualified or of doubtful financial ability or fails to meet any other pertinent standard or criteria established by the Owner.

16.2 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. 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.

16.3 In evaluating Bids, Owner will consider the qualification of Bidders, 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.

The Owner will also consider whether the Bidder involved:

a) Maintains a permanent place of business;
b) Has adequate plant and equipment to do the work properly and expeditiously;

c) Has suitable financial status to meet obligations incidental to the work;
d) Has appropriate technical experience.

16.4. Owner may consider the qualifications and experience of Subcontractors, Suppliers, and other persons and organizations proposed for those portions of the Work as to which the identity of Subcontractors, Suppliers, and other persons and organizations must be submitted as provided in the Supplementary Conditions. Owner also may consider the operating costs, maintenance requirements, performance data and guarantees of major items of materials and equipment proposed for incorporation in the Work when such data is required to be submitted prior to the Notice of Award.

16.5. Owner may conduct such investigations as Owner deems necessary to assist in the evaluation of any bid and to establish the responsibility, qualifications and financial ability of Bidders, proposed Subcontractors, Suppliers and other persons and organizations to perform and furnish the Work in accordance with the Contract Documents to Owner's satisfaction within the prescribed time.

16.6. If the contract is to be awarded, it will be awarded to the Bidder whose evaluation by Owner indicates the award will be in the best interest of the Project.

16.7. If the contract is to be awarded, Owner will give Successful Bidder a Notice of Award within 90 days after the day of the Bid opening.

**ARTICLE 17** **MODIFICATIONS OF QUANTITIES:** If the lowest bona fide Bid exceeds the money available for the Work, the Owner reserves the right to delete enough of the Work to bring the cost within the available funds. The Owner also reserves the right to delete whichever items or portions of items considered to be in the best interest of the Owner.

**ARTICLE 18** **CONTRACT SECURITY:** The General Conditions and Supplementary Conditions set forth Owner's requirements as to performance and payment bonds. When the Successful Bidder delivers the executed Agreement to the Owner, it must be accompanied by the required performance and payment bonds.

**ARTICLE 19** **SIGNING THE AGREEMENT:** When the Owner gives a Notice of Award to the Successful Bidder, it will be accompanied by the required number of unsigned counterparts of the Agreement with all other written Contract Documents attached. Within 15 days thereafter, Contractor shall sign and deliver the required counterparts of the Agreement and attached documents to Owner with the required Bonds. Within 10 days thereafter, Owner shall deliver one fully signed counterpart to Contractor.

**ARTICLE 20** **LAWS AND REGULATIONS:** The Contractor shall comply with local, District, County, State, and Federal laws applicable to the work.

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 as amended through January 1, 2004 (PL 91–596) and under

Section 107 of the Contract Work and Safety Standards Act (PL) 91–54). The regulations are administered by the Department of Labor and the Contractor shall allow access to the project to personnel from this Department.

**ARTICLE 21** **CONTRACTOR'S AND SUBCONTRACTOR'S INSURANCE:** Contractor shall not commence work under this contract until obtaining all the insurance required by the Supplementary Conditions.

**ARTICLE 22** **TERMINATION OF CONTRACT:** If the Owner is made to stop construction of the work because of an order from a Court or State Department, the contract shall be terminated. Payment will be made for work completed and a proration of the work underway, materials stored, and for the overhead and profit of the completed work and work underway. Payment will not be made for anticipated profit and overhead on work not completed or underway.

# DOCUMENT 00 41 43

# BID FORM

**PROJECT IDENTIFICATION: Northwest Walterboro Sewer Improvements Phase I Gravity Sewer**

**CONTRACT IDENTIFICATION AND NUMBER: T&H Job #29851.0000**

**THIS BID IS SUBMITTED TO: Colleton County**

1. The undersigned BIDDER proposes and agrees, if this Bid is accepted, to enter into an agreement with OWNER in the form included in the Contract Documents to perform and furnish all Work as specified or indicated in the Contract Documents for the Bid Price and within the Bid Times indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.

2. BIDDER accepts all of the terms and conditions of the Advertisement or Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 90 days after the day of Bid opening, or for such longer period of time BIDDER may agree to in writing upon request of OWNER.

3. In submitting this Bid, BIDDER represents, as more fully set forth in the Agreement, that:

   a. BIDDER has examined and carefully studied the Plans and Specifications for the work and contractual documents relative thereto, and has read all Technical Provisions, Supplementary Conditions, and General Conditions, furnished prior to the opening of Bids and can fulfill the requirements of the work to be performed.

   b. BIDDER further acknowledges hereby receipt of the following Addenda:

| ADDENDUM NO. | DATE |
|---|---|
| | |
| | |
| | |
| | |

   c. BIDDER has visited the site and become familiar with and is satisfied as to the general, local and site conditions possibly affecting cost, progress, performance and furnishing of the Work;

   d. BIDDER is familiar with and is satisfied as to all federal, state, and local Laws and Regulations possibly affecting cost, progress, performance and furnishing of the Work.

e. BIDDER has carefully studied all reports of explorations and tests of subsurface conditions at or contiguous to the site and all drawings of physical conditions in or relating to existing surface or subsurface structure at or contiguous to the site (except underground Facilities) have been identified in the Supplementary Conditions. BIDDER acknowledges such reports and drawings are not Contract Documents and may not be complete for BIDDER's purposes. BIDDER acknowledges OWNER and Engineer do not assume responsibility for the accuracy or completeness of information and data shown or indicated in the Bidding Documents with respect to Underground Facilities at or contiguous to the site. BIDDER has obtained and carefully studied (or assumes responsibility for having done so) all such additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the site or otherwise which may affect cost progress, performance or furnishing of the work or which relate to any aspect of the means, methods, techniques, sequences and procedures of construction to be employed by BIDDER and safety precautions and programs incident thereto. BIDDER does not consider any additional examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance and furnishing of the Work in accordance with the times, price and other terms and conditions of the Bidding Documents.

f. BIDDER is aware of the general nature of Work to be performed by Owner and others at the site relating to Work for which this Bid is submitted as indicated in the Bidding Documents.

g. 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.

h. BIDDER has given ENGINEER written notice of all conflicts, errors, ambiguities, or discrepancies BIDDER has discovered in the Bidding Documents and the written resolution thereof by ENGINEER is acceptable to BIDDER. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work for which this Bid is submitted.

i. This bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; BIDDER has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; BIDDER has not solicited or induced any person, firm or corporation to refrain from bidding; and BIDDER has not sought by collusion to obtain for itself any advantage over any other Bidder or over OWNER.

4. BIDDER will complete the Work in accordance with the Contract Documents for the following price(s):

**BID PROPOSAL**

**PART A - MISCELLANEOUS WORK (GRAVITY SEWER)**

| Item | Description | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| 1 | Mobilization | 1 | LS | | |
| 2 | Maintenance and Protection of Traffic | 1 | LS | | |
| 3 | Construction Staking | 1 | LS | | |
| 4 | Clearing and Grubbing | 15 | AC | | |
| 5 | Silt Fence | 35000 | LF | | |
| 6 | Remove and Replace Asphalt Pavement | 175 | LF | | |
| 7 | Grassing | 15 | AC | | |
| 8 | Remove and Replace Unsuitable Material | 300 | CY | | |
| | Subtotal PART A - MISCELLANEOUS WORK: | | | | |

**PART B - GRAVITY SEWER SYSTEM**

| Item | Description | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| 9 | 21" PVC Gravity Sewer | 1900 | LF | | |
| 10 | 18" PVC Gravity Sewer | 11800 | LF | | |
| 11 | 36" Steel Casing (Open Cut) | 85 | LF | | |
| 12 | 36" Steel Casing (Jack and Bore) | 235 | LF | | |
| 13 | 42" Steel Casing (Open Cut) | 20 | LF | | |
| 14 | 42" Steel Casing (Jack and Bore) | 135 | LF | | |
| 15 | Pipe Bursting (8" Existing to Proposed 10") | 125 | LF | | |
| 16 | Standard Manhole (0-10') | 20 | EA | | |
| 17 | Standard Manhole (10' +) | 30 | EA | | |
| 18 | Doghouse Manhole | 1 | EA | | |
| 19 | Connection to Existing Manhole | 2 | EA | | |
| 20 | Bypass Pumping | 45 | DAY | | |
| 21 | Removal of Existing Gravity Sewer | 750 | LF | | |
| 22 | Sidewalk Remove / Repair | 250 | LF | | |
| | Subtotal PART B - SANITARY SEWER SYSTEM: | | | | |
| | **TOTAL BID (PART A + B):** | | | | |

| PART C - ADDITIVE ALTERNATE I (FORCE MAIN) | | | | | |
|---|---|---|---|---|---|
| Item | Description | Quantity | Units | Unit Price | Total |
| 23 | Mobilization | 1 | LS | | |
| 24 | Maintenance and Protection of Traffic | 1 | LS | | |
| 25 | Construction Staking | 1 | LS | | |
| 26 | Clearing and Grubbing | 11 | AC | | |
| 27 | Silt Fence | 28000 | LF | | |
| 28 | Remove and Replace Asphalt Pavement | 750 | LF | | |
| 29 | Remove and Replace Concrete Pavement | 75 | LF | | |
| 30 | Grassing | 11 | AC | | |
| 31 | 10" PVC Force Main | 20500 | LF | | |
| 32 | 10" Ductle Iron Force Main | 440 | LF | | |
| 33 | 10" FPVC Force Main Installed Via Horizontal Directional Drilling (to Include connecting fittings) | 2300 | LF | | |
| 34 | 20" Steel Casing (Open Cut) | 110 | LF | | |
| 35 | 20" Steel Casing (Jack and Bore) | 180 | LF | | |
| 36 | 10" 90-Degree Bend | 2 | EA | | |
| 37 | 10" 45-Degree Bend | 15 | EA | | |
| 38 | 10" 22.5-Degree Bend | 5 | EA | | |
| 39 | 10" 11.25-Degree Bend | 2 | EA | | |
| 40 | Air Release Valve | 11 | EA | | |
| | Subtotal PART C - ADDITIVE ALTERNATE I (FORCE MAIN): | | | | |
| | **TOTAL BID WITH ALTERNATE I (PART A + B + C):** | | | | |

| PART D - ADDITIVE ALTERNATE II (PUMP STATION AND FORCE MAIN) |
|---|

| Item | Description | Quantity | Units | Unit Price | Total |
|---|---|---|---|---|---|
| 41 | Mobilization | 1 | LS | | |
| 42 | Maintenance and Protection of Traffic | 1 | LS | | |
| 43 | Construction Staking | 1 | LS | | |
| 44 | Clearing and Grubbing | 11 | AC | | |
| 45 | Silt Fence | 28000 | LF | | |
| 46 | Pump Station (to include wetwell, pumps, all piping, equipment and components with in wetwell, and all above ground pipe to the 90 degree bend of proposed force main at Sta: 228+68) | 1 | EA | | |
| 47 | Pump Station Site Work (to include pump station and equipment pad, site grading, and fencing) | 1 | EA | | |
| 48 | Pump Station Access Road | 1 | EA | | |
| 49 | Pump Station Building (to include control panel, all equipment, drainage, and electrical work | 1 | EA | | |
| 50 | Pump Station Generator | 1 | EA | | |
| 51 | Standard Manhole (10' +) | 2 | EA | | |
| 52 | 12" PVC Gravity Sewer | 65 | LF | | |
| 53 | Remove and Replace Asphalt Pavement | 750 | LF | | |
| 54 | Remove and Replace Concrete Pavement | 75 | LF | | |
| 55 | Grassing | 11 | AC | | |
| 56 | 10" PVC Force Main | 20500 | LF | | |
| 57 | 10" Ductle Iron Force Main | 440 | LF | | |
| 58 | 10" FPVC Force Main Installed Via Horizontal Directional Drilling (to Include connecting fittings) | 2300 | LF | | |
| 59 | 20" Steel Casing (Open Cut) | 110 | LF | | |
| 60 | 20" Steel Casing (Jack and Bore) | 180 | LF | | |
| 61 | 10" 90-Degree Bend | 2 | EA | | |
| 62 | 10" 45-Degree Bend | 15 | EA | | |
| 63 | 10" 22.5-Degree Bend | 5 | EA | | |
| 64 | 10" 11.25-Degree Bend | 2 | EA | | |
| 65 | Air Release Valve | 11 | EA | | |
| Subtotal PART D - ADDITIVE ALTERNATE II (PUMP STATION AND FORCE MAIN): | | | | | |
| **TOTAL BID WITH ALTERNATE II (A + B +D):** | | | | | |

**TOTAL BID** FOR ALL ESTIMATED PRICES (Section A + B)_____
*(Use words)*

_____ ($_____)
*(Figures)*

**TOTAL BID WITH ALTERNATE I** FOR ALL ESTIMATED PRICES (Section A + B + C)_____
*(Use words)*

_____ ($_____)
*(Figures)*

**TOTAL BID WITH ALTERNATE II** FOR ALL ESTIMATED PRICES (Section A +B + D)_____
*(Use words)*

_____ ($_____)
*(Figures)*

Depending on availability of alternative funds the OWNER may elect to select the estimated prices of the **TOTAL BID**, **TOTAL BID WITH ALTERNATE I**, or **TOTAL BID WITH ALTERNATE II**.

Unit Prices have been computed in accordance with paragraph 11.03.C of the General Conditions.

BIDDER acknowledges 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, determined as provided in the Contract Documents.

5. BIDDER agrees the Work for **Total Bid** will be substantially complete within 360 calendar days after the date when the Contract Times commence to run as provided in paragraph 2.03 of the General Conditions and completed and ready for final payment in accordance with paragraph 14.07 of the General Conditions within 390 calendar days after the date when the Contract Times commence to run. Due to funding requirements, the final completion date must be before June 30, 2025.

6. BIDDER accepts provisions of the Agreement as to liquidated damages in the event of failure to complete the Work within times specified in the Agreement.

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

    a. Required Bid Security in the form of 10 percent of the Bid Total Price.

    b. Required BIDDER's Qualification Statement with supporting data.

8. The undersigned further agrees in case of failure on his/her part to execute the said contract and the Bond within 15 consecutive calendar days after written notice being given of the award of the contract, the check or bid bond accompanying this bid, and the monies payable thereon shall be paid into the funds of the Owner as liquidated

damages for such failure, otherwise, the check or bid bond accompanying this proposal shall be returned to the undersigned.

9. Communications concerning this Bid shall be addressed to:

_____
_____
_____

Attn: _____

10. Terms used in this Bid which are defined in the General Conditions or Instructions will have the meanings indicated in the General Conditions of Instructions.

SUBMITTED on _____, 2025.

_____
CONTRACTOR'S NAME

ADDRESS:

_____

_____

BY:_____

_____

State Contractor License No._____

State Bidder License No._____

State Utility Contractor License No. _____

**DOCUMENT 00 43 13**

**BID SECURITY FORM**

---

**BIDDER** (Name and Address):

_____

_____

_____

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

_____

_____

_____

**OWNER** (Name and Address):

**Colleton County**

**109 Benson Street**

**Walterboro, SC 29488**

**BID**

BID DUE DATE: _____

PROJECT: *Northwest Walterboro Sewer Improvements Phase I Gravity Sewer*

**BOND**

BOND NUMBER: _____ DATE: _____

*(Not later than Bid Due Date)*

PENAL SUM: _____

*(10% of Bid Sum)*

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

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

Note: (1) Above addresses are to be used for giving required notice.
(2) Any singular reference to Bidder, Surety, Owner, or other party shall be considered plural where applicable.

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

2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents and Contract 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 and Contract Document, or

   3.2 All bids are rejected by Owner, or

   3.3 Owner fails to issue a notice of award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by bidder and, if applicable, consented to by Surety when required by paragraph 5 hereof.)

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

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

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

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

8. Notice 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 the Bond conflicts with any applicable provision of 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.

**SECTION 00 51 00**

**NOTICE OF AWARD**

---

Dated _____

TO: _____
*(Bidder)*

ADDRESS: _____

_____

JOB NO.: 29851.0000

PROJECT: Northwest Walterboro Sewer Improvements Phase I Gravity Sewer

CONTRACT FOR: Installation of approximately 11,800 linear feet of 18-inch gravity sewer, 2000 linear feet of 21-inch gravity sewer, and 50 manholes.

---

You are notified your Bid dated _____, 2025, for the above Contract has been considered. You are the apparent successful bidder and have been awarded a contract for:

_____.
*(Indicate total Work, alternates or sections of Work awarded)*

The Contract Price of your contract is _____

_____ Dollars ($_____).

6 copies of each of the proposed Contract Documents (except drawings)

accompany this Notice of Award.

___3___ sets of the Drawings will be delivered separately or otherwise made available to you immediately.

You must comply with the following conditions precedent within 15 days of this Notice of Award, which is by _____, 2025.

1. You must deliver to the OWNER _____ fully executed counterparts of the Agreement including all the Contract Documents. Each of the Contract Documents must bear your signature on the page (pages _____.)

2. You must deliver with the executed Agreement the Contract Security (Bonds) as specified in the Instructions to Bidders (Article 8), General Conditions (paragraph 5.01) and Supplementary Conditions.

3. (List other conditions precedent)

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

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

_____
OWNER

By: _____

_____
(Title)

**ACCEPTANCE OF AWARD**

_____
CONTRACTOR

By: _____
(Authorized Signature)

_____
(Title)

_____
(Date)

# DOCUMENT 00 52 43

# AGREEMENT FORM

**THIS AGREEMENT** is dated as of the _____ day of _____ in the year 2025 by and between Colleton County (hereinafter called OWNER) and _____ (hereinafter called CONTRACTOR).

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

## ARTICLE 1 WORK

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

The installation of approximately 11,800 linear feet of 18-inch gravity sewer, 2000 linear feet of 21-inch gravity sewer, and 50 manholes

## ARTICLE 2 ENGINEER

The Project has been designed by Thomas & Hutton Engineering Co. who is hereinafter called ENGINEER and who is to act as OWNER's representative, assume all duties and responsibilities and have the rights and authority assigned to ENGINEER in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

## ARTICLE 3 CONTRACT TIMES

All time limits for Substantial Completion and completion and readiness for final payment as stated in the Contract Documents are of essence to the Contract.

3.1 The Work will be substantially completed within 360 days after the date when the Contract Times commence to run as provided in paragraph 2.03 of the General Conditions, and completed and ready for final payment in accordance with paragraph 14.07 of the General Conditions within 390 days after the date when the Contract Times commence to run, due to funding requirements final completion must before June 30, 2026.. Included in the contract times are 10 days for rain delay. Time delays due to rain in excess of the above days shall be reported by the Contractor to the Engineer in writing, within 30 days of each event.

3.2 *Liquidated Damages.* OWNER and CONTRACTOR recognize time is of the essence for this Agreement and OWNER will suffer financial loss if the Work is not completed within the times specified in paragraph 3.1 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 the actual loss suffered by OWNER if the Work is not substantially complete on time. Accordingly, instead of requiring any such proof, OWNER and CONTRACTOR agree to liquidated damages for delay (but not as a penalty) the CONTRACTOR shall pay OWNER Five Hundred dollars ($500.00) for each day expiring after the time

specified in paragraph 3.1 for Substantial Completion until the Work is substantially complete. After Substantial completion, if CONTRACTOR shall neglect, refuse or fail to complete the remaining Work within the time specified in paragraph 3.1 for completion and readiness for final payment or any proper extension thereof granted by OWNER, CONTRACTOR, shall pay OWNER Five Hundred dollars ($500.00) for each day expiring after the time specified in paragraph 3.1 for completion and readiness for final payment.

**ARTICLE 4 CONTRACT PRICE**

4.1 *UNIT PRICE WORK*

OWNER shall pay CONTRACTOR for completion of the Work in accordance with the Contract Documents an amount in current funds of the amounts determined 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 item as indicated in the CONTRACTOR'S UNIT PRICE BID (attached hereto as an exhibit), said amount being:

_____(dollars), $_____
*(use words)* *(figures)*

As provided in paragraph 11.03 of the General Conditions estimated quantities are not guaranteed, and determinations of actual quantities and classification are to be made by ENGINEER as provided in paragraph 9.07 of the General Conditions. Unit prices have been computed as provided in paragraph 11.03C of the General Conditions.

**ARTICLE 5 PAYMENT PROCEDURES**

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.

5.1 *Progress Payments; Retainage*. OWNER shall make progress payments on account of the Contract Price on the basis of CONTRACTOR's Applications for Payment as recommended by ENGINEER, on or about the **25th** day of each month during performance of the Work as provided in paragraphs 5.1.1., 5.1.1.2. and 5.2. below. All such payments will be measured by the schedule of values established in paragraph 2.07 of the General Conditions (and in the case of Unit Price Work based on the number of units completed) as provided in the General Requirements.

5.1.1 *For Cost of Work:* Progress payments on account of the Cost of the Work will be made:

5.1.1.1 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 shall determine, or OWNER may withhold, in accordance with paragraph 14.02 of the General Conditions.

**90%** of the Work completed (with the balance being retainage). If 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 as long as the character and progress of the Work remain satisfactory to them, there will be no additional retainage on account of Work completed, in which case the remaining progress payments prior to Substantial Completion will be in an amount equal to 100% of the Work completed.

**90%** of Cost of the Work (with the balance being retainage) applicable to materials and equipment not incorporated in the Work (but delivered, suitably stored and accompanied by documentation satisfactory to OWNER as provided in paragraph 14.02.A.1 of the General Conditions).

5.1.1.2 Upon Substantial Completion, in an amount sufficient to increase the total payments to CONTRACTOR to **95%** of the Cost of the Work, (with the balance being retainage), less such amounts as ENGINEER shall determine, or OWNER may withhold, in accordance with paragraph 14.02 of the General Conditions.

5.2 *Final Payment.* 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 6 INTEREST**

All moneys not paid within thirty (30) days of the due date as provided in Article 14 of the General Conditions, shall bear interest at the rate of 6 percent annually or the minimum required by law at the place of the Project, whichever is greater. Any Interest accrued cannot be paid with SCIIP grant funds.

**ARTICLE 7 CONTRACTOR'S REPRESENTATIONS**

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

7.1 CONTRACTOR has examined and carefully studied the Contract Documents (including the Addenda indicated in Article 8 hereinafter) and the other related data identified in the Bidding Documents.

7.2 CONTRACTOR has visited the site and become familiar with and is satisfied as to the general, local and site conditions possibly affecting cost, progress, performance or furnishing of the Work.

7.3 CONTRACTOR is familiar with and is satisfied as to all federal, state, and local Laws and Regulations possibly affecting cost, progress, performance and furnishing of the Work.

7.4 CONTRACTOR has carefully studied all reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in the General Conditions. CONTRACTOR acknowledges such reports and drawings are not Contract Documents and may not be complete for CONTRACTOR's purposes. CONTRACTOR acknowledges OWNER and ENGINEER do not assume responsibility for the accuracy or completeness of information and data shown or indicated in the Contract Documents with respect to Underground Facilities at or contiguous to the site. CONTRACTOR has obtained and carefully studied (or assumes responsibility for having done so) all such additional supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the site or otherwise which may affect cost, progress, performance or furnishing of the construction to be employed by CONTRACTOR and safety precautions and programs incident thereto. CONTRACTOR does not consider any additional examinations, investigations, explorations, tests, studies, or data are necessary for the performance and furnishing of the Work at the Contract Price, within the Contract Times and in accordance with the other terms and conditions of the Contract Documents.

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

7.6 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.

7.7 CONTRACTOR has given ENGINEER written notice of all conflicts, errors, ambiguities, or discrepancies CONTRACTOR has discovered in the Contract Documents and the written resolution thereof by ENGINEER is acceptable to CONTRACTOR, and the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

**ARTICLE 8 CONTRACT DOCUMENTS**

The Contract Documents which comprise the entire agreement between OWNER and CONTRACTOR concerning the Work consist of the following:

8.1 Invitation to Bid (Pages 00 11 16–1 to 00 11 16–2, inclusive)

8.2 Instructions to Bidders (pages 00 21 13–1 to 00 21 13–__, inclusive)

8.3 Bid Form (pages 00 41 43–1 to 00 41 43–__, inclusive)

8.4 Bid Security(pages 00 43 13–1 to 00 43 13–__, inclusive)

8.5 Notice of Award (pages 00 51 00–1 to pages 00 51 00–__, inclusive)

8.6 Agreement Form – Unit Price (Single – Prime Contract) (pages 00 52 43–1 to 00 52 43–__, inclusive)

8.7 Notice to Proceed (pages 00 55 00–1 to 00 55 00–__, inclusive)

8.8 Performance Bond (pages 00 61 13.13–1 to 00 61 13.13–__. Inclusive)

8.9 Payment Bond (pages 00 61 13.16–1 to 00 61 13.16–__, inclusive)

8.10 General Conditions (pages 00 72 43–1 to 00 72 43–62, inclusive)

8.11 Supplementary Conditions (pages 00 73 00–1 to 00 73 00–__, inclusive)

8.12 Special Conditions (pages 00 80 00–1 to 00 80 00–__, inclusive)

8.13 Summary of Work (pages 01 11 00–1 to 01 11 00–__, inclusive)

8.14 Unit Prices (pages 01 22 00–1 to 01 22 00–__, inclusive)

8.15 Submittal Procedures (pages 01 33 00–1 to 01 33 00–__, inclusive)

8.16 Quality Control (pages 01 45 00–1 to 01 45 00–__, inclusive)

8.17 Testing and Inspecting Services (pages 01 45 23–1 to 01 45 23–__, inclusive)

8.18 Closeout Procedures (pages 01 77 00–1 to 01 77 00–__, inclusive)

8.19 Operation and Maintenance Data (pages 01 78 23–1 to 01 78 23–__, inclusive)

8.20 Bonds (pages 01 78 33–1 to 01 78 33–___, inclusive)

8.21 Warranties (pages 01 78 36–1 to 01 78 36_, inclusive)

8.22 Technical Specifications consisting of 10 sections, as listed in the Table of Contents.

8.23 Drawings consisting of sheets CO through EC 2.3 with each sheet bearing the following general title:

| SHEET NO. | TITLE | PE SIGNATURE DATE | FILE NUMBER |
|---|---|---|---|
| CO | COVER SHEET | 1/2/2024 | 29851.0000 |
| GN.01 | GENERAL NOTES & INDEX | 1/2/2024 | 29851.0000 |
| C1.0 | OVERALL SITE PLAN | 1/2/2024 | 29851.0000 |
| C2.0 | GRAVITY SEWER SHEET KEY | 1/2/2024 | 29851.0000 |
| C2.1 | GRAVITY SEWER PLAN & PROFILE | 1/2/2024 | 29851.0000 |
| C2.2 | GRAVITY SEWER PLAN & PROFILE | 1/2/2024 | 29851.0000 |
| C2.3 | GRAVITY SEWER PLAN & PROFILE | 1/2/2024 | 29851.0000 |

| | | | |
|---|---|---|---|
| C2.4 | GRAVITY SEWER PLAN & PROFILE | 1/2/2024 | 29851.0000 |
| C2.5 | GRAVITY SEWER PLAN & PROFILE | 1/2/2024 | 29851.0000 |
| C2.6 | GRAVITY SEWER PLAN & PROFILE | 1/2/2024 | 29851.0000 |
| C2.7 | GRAVITY SEWER PLAN & PROFILE | 1/2/2024 | 29851.0000 |
| C2.8 | GRAVITY SEWER PLAN & PROFILE | 1/2/2024 | 29851.0000 |
| C2.9 | GRAVITY SEWER PLAN & PROFILE | 1/2/2024 | 29851.0000 |
| C2.10 | GRAVITY SEWER PLAN & PROFILE | 1/2/2024 | 29851.0000 |
| C2.11 | GRAVITY SEWER PLAN & PROFILE | 1/2/2024 | 29851.0000 |
| C5.0 | UTILITY DETAILS | 1/2/2024 | 29851.0000 |
| C5.1 | UTILITY DETAILS | 1/2/2024 | 29851.0000 |
| EC0.1 | EROSION CONTROL NOTES | 1/2/2024 | 29851.0000 |
| EC0.2 | EROSION CONTROL CHARTS | 1/2/2024 | 29851.0000 |
| EC1.0 | EROSION CONTROL OVERALL | 1/2/2024 | 29851.0000 |
| EC1.1 | EROSION CONTROL PLAN | 1/2/2024 | 29851.0000 |
| EC1.2 | EROSION CONTROL PLAN | 1/2/2024 | 29851.0000 |
| EC1.3 | EROSION CONTROL PLAN | 1/2/2024 | 29851.0000 |
| EC1.4 | EROSION CONTROL PLAN | 1/2/2024 | 29851.0000 |
| EC1.5 | EROSION CONTROL PLAN | 1/2/2024 | 29851.0000 |
| EC1.6 | EROSION CONTROL PLAN | 1/2/2024 | 29851.0000 |
| EC2.1 | EROSION CONTROL DETAILS | 1/2/2024 | 29851.0000 |
| EC2.2 | EROSION CONTROL DETAILS | 1/2/2024 | 29851.0000 |
| EC2.3 | EROSION CONTROL DETAILS | 1/2/2024 | 29851.0000 |

8.24 Addenda numbers ____ to ____, inclusive.

Exhibits to this Agreement:

a. CONTRACTOR's Bid (page _____ through page _____ inclusive) marked "Exhibit _____."

b. Documentation submitted by CONTRACTOR prior to Notice of Award (pages ___ to ___, inclusive).

c. Any modification, including Change Orders, duly delivered after execution of Agreement.

d. [_____]

There are no Contract Documents other than those listed above in this Article 8. The Contract Documents may only be amended, modified, or supplemented as provided in paragraph 3.04 of the General Conditions.

**ARTICLE 9 MISCELLANEOUS**

9.1 Terms used in this Agreement which are defined in Article 1 of the General Conditions will have the meanings indicated in the General Conditions.

9.2 No assignment by a party hereto of any rights under or interests in the Contract Documents will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys becoming due and moneys due, may not be assigned without such consent (except to the extent 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.

9.3 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.

9.4 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 the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision coming as close as possible to expressing the intention of the stricken provision.

**ARTICLE 10 OTHER PROVISIONS**

IN WITNESS WHEREOF, OWNER and CONTRACTOR have signed this Agreement in five counterparts. Two counterparts each have been delivered to OWNER and CONTRACTOR and one counterpart to ENGINEER. All portions of the Contract Documents have been signed, initialed or identified by Owner and Contractor or identified by ENGINEER on their behalf.

This Agreement will be effective on _____, 2025 (which is the Effective Date of the Agreement).

| | |
|---|---|
| OWNER Colleton County | CONTRACTOR _____ |
| BY *(typed)* _____ | BY *(typed)* _____ |
| BY _____ | BY _____ |
| ATTEST _____ | ATTEST _____ |

Address for giving notices

_____
_____
_____

Address for giving notices

_____
_____
_____

License No._____

Agent for service of process:_____
_____

CORPORATE SEAL

CORPORATE SEAL

## Section 00 55 00

## NOTICE TO PROCEED

Dated: _____

TO: _____
*(Bidder)*

ADDRESS: _____

_____

JOB NO.: J– 29851.0000

PROJECT: Northwest Walterboro Sewer Improvements Phase I Gravity Sewer

CONTRACT FOR: The installation of approximately 11,800 linear feet of 18-inch gravity sewer, 2000 linear feet of 21-inch gravity sewer, and 50 manholes

---

You are notified the Contract Times under the above contract will commence to run on _____, **2025**. By such date, you are to start performing your obligations under the Contract Documents. In accordance with Article 3 of the Agreement the dates of Substantial Completion and completion and readiness for final payment are _____, 2025 and _____, 2025, respectively.

Before you may start any Work at the site, paragraph 2.01 of the General Conditions provides you and OWNER must each deliver to the other (with copies to ENGINEER and other identified additional insureds) certificates of insurance which each is required to purchase and maintain in accordance with the Contract Documents.

Before you may start any Work at the site, you must have submitted the following: Certificate of Insurance, Performance Bond, and Payment Bond.

Colleton County
OWNER

By: _____

_____
(Title)

***ACCEPTANCE OF NOTICE TO PROCEED***

_____
CONTRACTOR

By: _____
(Authorized Signature)

_____
(Title)

_____
(Date)

**DOCUMENT 00 61 13.13**

**PERFORMANCE BOND FORM**

KNOW ALL MEN BY THESE PRESENTS, _____,
(Name & Address of Contractor)

hereinafter called "Principal" and _____,
(Name & Address of Surety)

_____ of _____

State of **South Carolina**, hereinafter called the "Surety" are held and

firmly bound unto _____

hereinafter called the "Owner" in the penal sum of _____

_____ Dollars ($_____)
(Contract Sum)

lawful money of the United States of America, to be paid to OWNER, for the payment whereof well and truly to be made we do bind ourselves, our respective executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the above bounden Principal has entered into a certain contract with the Owner dated the _____ day of _____, 20____ for the construction of:

Northwest Walterboro Sewer Improvements Phase I Gravity Sewer
(Name of Contract/Project)

which said contract is incorporated hereby by reference and made a part hereof, and is hereinafter referred to as the Construction Contract.

NOW THEREFORE, THE CONDITION OF THIS OBLIGATION is such, if the Principal shall promptly and faithfully perform and comply with the terms and conditions of said contract; and shall indemnify and save harmless the Owner against and from all costs, expenses, damages, injury or loss to which said Owner may be subjected by reason of any wrongdoing, including patent infringement, misconduct, want of care or skill, default, or failure of performance on the part of said Principal, its agents, subcontractors or employees, in the execution or performance of said Construction Contract, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

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

2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except to participate in conferences as provided in Subparagraph 3.1.

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

   3.1 The Owner has notified the Contractor and the Surety at its address described in Paragraph 10 below, the Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with the Contractor and the Surety to be held not later than fifteen days after receipt of such notice to discuss methods of performing the Construction Contract. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default; and

   3.2 The Owner has declared a Contractor Default and formally terminated the Contractor's right to complete the contract. Such Contractor Default shall not be declared earlier than twenty days after the Contractor and the Surety have received notice as provided in Subparagraph 3.1; and

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

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

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

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

   4.3 Obtain bids or negotiated proposals from qualified Contractors acceptable to the Owner in a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and the Contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 6 in excess of the Balance of the Contract Price incurred by the Owner resulting from the Contractor's 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:

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

4.4.2 Deny liability in whole or in part and notify the Owner citing reasons therefor.

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

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

6.1 The responsibilities of the Contractor for correction of defective work and completion of the Construction Contract:

6.2 Additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 4; and

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

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

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

9. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum

period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

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

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

12. DEFINITIONS:

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

    12.2 Construction Contract: The agreement between the Owner and the Contractor identified on the signature page, including all Contract Documents and changes thereto;

    12.3 Contractor Default: Failure of the Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Construction Contract.

    12.4 Owner Default: Failure of the Owner, which has neither been remedied nor waived, to pay the Contractor as required by the Construction Contract or to perform and complete or comply with the other terms thereof.

IN WITNESS WHEREOF, this instrument is executed in six counterparts, each one of which shall be deemed an original, on this the _____ day of _____, 20___.

**CONTRACTOR AS PRINCIPAL:**

_____
Principal

_____
(Principal) Secretary

By:_____
(Signature & Title)

(SEAL)

_____
Address

_____

_____
Witness as to Principal

_____
Address

_____

**SURETY:**

_____

_____
Surety (Company)

_____
(Surety) Secretary

By:_____
Attorney–in–Fact

(SEAL)

_____
Witness as to Surety

_____
Address

_____

Notes:

1. Date of Bond must not be prior to date of Contract. If Contractor is a Partnership, all partners should execute bond.

2. Bond must be countersigned by a South Carolina resident agent.

3. Surety companies executing bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the project is located.

**DOCUMENT 00 61 13.16**

**PAYMENT BOND FORM**

KNOW ALL MEN BY THESE PRESENTS, _____,
(Name & Address of Contractor)

hereinafter called "Principal" and _____,
(Name & Address of Surety)

_____ of _____

State of **South Carolina**, hereinafter called the "Surety" are held and

firmly bound unto _____

hereinafter called the "Owner" in the penal sum of _____

_____ Dollars ($_____)
(Contract Sum)

lawful money of the United States of America, to be paid to OWNER, for the payment whereof well and truly to be made we do bind ourselves, our respective executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the above bounden Principal has entered into a certain contract with the Owner dated the _____ day of _____, 20____ for the construction of:

Northwest Walterboro Sewer Improvements Phase I Gravity Sewer
(Name of Contract/Project)

which said contract is incorporated hereby by reference and made a part hereof, and is hereinafter referred to as the Construction Contract.

NOW THEREFORE, THE CONDITION OF THIS OBLIGATION is such, if the Principal shall promptly make payment to all claimants as hereinafter defined, for all labor and materials supplied in the prosecution of the work provided for in said Construction Contract, then this obligation shall be void; otherwise it shall remain in full force and effect, subject, however, to the following conditions:

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

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

2.1 Promptly makes payment, directly or indirectly, for all sums due Claimants; and

2.2 Defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity whose claim, demand, lien or suit is for payment for labor, materials or equipment furnished for use in the performance of the Construction Contract, provided the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 12) of any claims, demands, liens or suits and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety, and provided there is no Owner Default.

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

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

4.1 Claimants who are employed by or have a direct contract with the Contractor have given notice to the Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to the Owner, stating a claim is being made under this Bond and, with substantial accuracy, the amount of claim.

4.2 Claimants who do not have a direct contract with the Contractor:

4.2.1 Have furnished written notice to the Contractor and sent a copy, or notice thereof, to the Owner, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials were furnished or supplied or for whom the labor was performed; and

4.2.2 Have either received a rejection in whole or in part from the Contractor, or not received within 30 days of furnishing the above notice, any communication from the Contractor by which the Contractor has indicated the claim will be paid directly or indirectly; and

4.2.3 Not having been paid within 30 days, have sent a written notice to the Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to the Owner, stating a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to the Contractor.

5. Compliance shall be considered sufficient if a notice required by paragraph 4 is given by the Owner to the Contractor or to the Surety.

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

6.1 Send an answer to the Claimant, with a copy to the Owner, within 45 days after receipt of the claim stating the amounts undisputed and basis for challenging any amounts disputed.

6.2 Pay or arrange for payment of any undisputed amounts.

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

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

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

10. The Surety hereby waives notice of any change, including changes of time, to the Construction 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 Subparagraph 4.1 or Clause 4.2.3, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to Sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to the Surety, Owner or Contractor shall be mailed or delivered to the address shown on the signature page. Actual receipt of notice by the 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 or other legal requirement in the location where the construction was to be performed, any provision in the Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is this Bond shall be construed as a statutory bond and not as a common law bond.

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

15. DEFINITIONS:

15.1 Claimant: An individual or entity having a direct contract with the Contractor or with a Subcontractor of the Contractor to furnish labor, material, 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 Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's Subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

15.2 Construction Contract: The agreement between the Owner and the Contractor identified on the signature page, including all Contract Documents and changes thereto.

15.3 Owner Default: Failure of the Owner, which has neither been remedied nor waived, to pay the Contractor as required by the Construction Contract or to perform and complete or comply with the other terms thereof.

IN WITNESS WHEREOF, this instrument is executed in six counterparts, each one of which shall be deemed an original, on this the _____ day of _____, 20___.

**CONTRACTOR AS PRINCIPAL:**

_____
Principal

_____
(Principal) Secretary

By:_____
(Signature & Title)

(SEAL)

_____
Address

_____

_____
Witness as to Principal

_____
Address

_____

**SURETY:**

_____

_____
Surety (Company)

_____
(Surety) Secretary

By:_____
Attorney–in–Fact

(SEAL)

_____
Witness as to Surety

_____
Address

_____

Notes:

1. Date of Bond must not be prior to date of Contract. If Contractor is a Partnership, all partners should execute bond.

2. Bond must be countersigned by a South Carolina resident agent.

3. Surety companies executing bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the project is located.

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

# STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

**Prepared By**

EJCDC®
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

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

# GUIDELINES FOR USE OF EJCDC® C-700, STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

## 1.0 PURPOSE AND INTENDED USE OF THE DOCUMENT

EJCDC® C-700, Standard General Conditions of the Construction Contract (2018), is the foundation document for the EJCDC Construction Series. The General Conditions define the basic rights, responsibilities, risk allocations, and contractual relationship of the Owner and Contractor, and establish how the Contract is to be administered.

## 2.0 OTHER DOCUMENTS

EJCDC documents are intended to be used as a system and changes in one EJCDC document may require a corresponding change in other documents. Other EJCDC documents may also serve as a reference to provide insight or guidance for the preparation of this document.

These General Conditions have been prepared for use with either EJCDC® C-520, Agreement Between Owner and Contractor for Construction Contract (Stipulated Price), or EJCDC® C-525, Agreement Between Owner and Contractor for Construction Contract (Cost-Plus-Fee) (2018 Editions). The provisions of the General Conditions and the Agreement are interrelated, and a change in one may necessitate a change in the other.

To prepare supplementary conditions that are coordinated with the General Conditions, use EJCDC® C-800, Supplementary Conditions of the Construction Contract (2018).

The full EJCDC Construction series of documents is discussed in the EJCDC® C-001, Commentary on the 2018 EJCDC Construction Documents (2018).

## 3.0 ORGANIZATION OF INFORMATION

All parties involved in a construction project benefit significantly from a standardized approach in the location of subject matter throughout the documents. Experience confirms the danger of addressing the same subject matter in more than one location; doing so frequently leads to confusion and unanticipated legal consequences. Careful attention should be given to the guidance provided in EJCDC® N-122/AIA® A521, Uniform Location of Subject Matter (2012 Edition) when preparing documents. EJCDC® N-122/AIA® A521 is available at no charge from the EJCDC website, www.ejcdc.org, and from the websites of EJCDC's sponsoring organizations.

If CSI MasterFormat™ is used for organizing the Project Manual, consult CSI MasterFormat™ for the appropriate document number (e.g., under 00 11 00, Advertisements and Invitations), and accordingly number the document and its pages.

## 4.0 EDITING THIS DOCUMENT

Remove these Guidelines for Use. Some users may also prefer to remove the two cover pages.

Although it is permissible to revise the Standard EJCDC Text of C-700 (the content beginning at page 1 and continuing to the end), it is common practice to leave the Standard EJCDC Text of C-700 intact and unaltered, with modifications and supplementation of C-700's provisions set forth in EJCDC® C-800, Supplementary Conditions of the Construction Contract (2018). If the Standard Text itself is revised, the

user must comply with the terms of the License Agreement, Paragraph 4.0, Document-Specific Provisions, concerning the tracking or highlighting of revisions. The following is a summary of the relevant License Agreement provisions:

1. The term "Standard EJCDC Text" for C-700 refers to all text prepared by EJCDC in the main body of the document. Document covers, logos, footers, instructions, or copyright notices are not Standard EJCDC Text for this purpose.
2. During the drafting or negotiating process for C-700, it is important that the two contracting parties are both aware of any changes that have been made to the Standard EJCDC Text. Thus, if a draft or version of C-700 purports to be or appears to be an EJCDC document, the user must plainly show all changes to the Standard EJCDC Text, using "Track Changes" (redline/strikeout), highlighting, or other means of clearly indicating additions and deletions.
3. If C-700 has been revised or altered and is subsequently presented to third parties (such as potential bidders, grant agencies, lenders, or sureties) as an EJCDC document, then the changes to the Standard EJCDC Text must be shown, or the third parties must receive access to a version that shows the changes.
4. Once the document is ready to be finalized (and if applicable executed by the contracting parties), it is no longer necessary to continue to show changes to the Standard EJCDC Text. The user may produce a final version of the document in a format in which all changes are accepted, and the document at that point does not need to include any "Track Changes," redline/strikeout, highlighting, or other indication of additions and deletions to the Standard EJCDC Text.

## 5.0 LICENSE AGREEMENT

This document is subject to the terms and conditions of the **License Agreement, 2018 EJCDC® Construction Series Documents**. A copy of the License Agreement was furnished at the time of purchase of this document, and is available for review at www.ejcdc.org and the websites of EJCDC's sponsoring organizations.

# STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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# STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

## ARTICLE 1—DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

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

2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.

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

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

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

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

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

8. *Change Order*—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.

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

10. *Claim*

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

29. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.

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

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

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

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

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

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

36. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

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

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

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

40. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.

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

42. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion of such Work.

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

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

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

46. *Technical Data*

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

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

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

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

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

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

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

1.02 *Terminology*

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

B. *Intent of Certain Terms or Adjectives*: The Contract Documents include the terms "as allowed," "as approved," "as ordered," "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.

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

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

1. does not conform to the Contract Documents;

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

3. has been damaged prior to Engineer's recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or Paragraph 15.04).

E. *Furnish, Install, Perform, Provide*

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

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

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

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

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

G. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

**ARTICLE 2—PRELIMINARY MATTERS**

2.01 *Delivery of Performance and Payment Bonds; Evidence of Insurance*

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

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

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

2.02 *Copies of Documents*

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

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

2.03 *Before Starting Construction*

A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise required by the Contract Documents), Contractor shall submit to Engineer for timely review:

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

2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work

into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work, and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other Submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.

B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *Acceptance of Schedules*

A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review the schedules submitted in accordance with Paragraph 2.03.A. No progress payment will be made to Contractor until acceptable schedules are submitted to Engineer.

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.

3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.

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

2.06 *Electronic Transmittals*

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

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

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

## ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

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

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

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

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

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

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

G. Nothing in the Contract Documents creates:

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

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

3.02 *Reference Standards*

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

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

2. No provision of any such standard specification, manual, reference standard, or code, and no instruction of a Supplier, will be effective to change the duties or responsibilities of Owner, Contractor, or Engineer from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner or Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility

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

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

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

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

3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:

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

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

3.04 *Requirements of the Contract Documents*

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

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

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

3.05 *Reuse of Documents*

A. Contractor and its Subcontractors and Suppliers shall not:

1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media versions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or

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

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

**ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK**

4.01 *Commencement of Contract Times; Notice to Proceed*

A. The Contract Times will commence to run on the 30th day after the Effective Date of the Contract or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Contract. In no event will the Contract Times commence to run later than the 60th day after the day of Bid opening or the 30th day after the Effective Date of the Contract, whichever date is earlier.

4.02 *Starting the Work*

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

4.03 *Reference Points*

A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the

established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.04 *Progress Schedule*

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.

1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.

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

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

4.05 *Delays in Contractor's Progress*

A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times.

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

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

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

2. Abnormal weather conditions;

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

4. Acts of war or terrorism.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

5.01 *Availability of Lands*

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

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

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

5.02 *Use of Site and Other Areas*

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

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

2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.13, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or in a court of competent jurisdiction; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.

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

C. *Cleaning*: Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment

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

D. *Loading of Structures*: Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent structures or land to stresses or pressures that will endanger them.

5.03 *Subsurface and Physical Conditions*

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

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

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

3. Technical Data contained in such reports and drawings.

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

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

D. *Limitations of Other Data and Documents*: Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

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

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

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

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

5.04 *Differing Subsurface or Physical Conditions*

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

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

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

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

4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

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

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

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

E. *Possible Price and Times Adjustments*

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

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

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

b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,

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

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

a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise;

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

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

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

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

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

5.05 *Underground Facilities*

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

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

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

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

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

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

B. *Notice by Contractor*: If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated on the Drawings, or was not shown or indicated on the Drawings with reasonable accuracy, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing regarding such Underground Facility.

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

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

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

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

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

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

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

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

F. *Possible Price and Times Adjustments*

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

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

a. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;

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

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

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

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

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

5.06 *Hazardous Environmental Conditions at Site*

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

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

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

3. Technical Data contained in such reports and drawings.

B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures

of construction to be employed by Contractor, and safety precautions and programs incident thereto;

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

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

C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.

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

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

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

G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, as a result of such Work stoppage, such special conditions under which Work is agreed to be resumed by Contractor, or any costs or expenses incurred in response to the Hazardous Environmental Condition, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off. Entitlement to any such adjustment is subject to the provisions of Paragraphs 4.05.D, 4.05.E, 11.07, and 11.08.

H. If, after receipt of such written notice, Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special

conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.

I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court, arbitration, or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.I obligates Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J obligates Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

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

## ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

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

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

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

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

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

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

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

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

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

6.02 *Insurance—General Provisions*

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

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

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

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

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

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

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

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

H. Contractor shall require:

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

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

I. If either party does not purchase or maintain the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.

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

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

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

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

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

6.03 *Contractor's Insurance*

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

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

1. include at least the specific coverages required;

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

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

4. apply with respect to the performance of the Work, whether such performance is by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable; and

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

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

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

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

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

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

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

6.04 *Builder's Risk and Other Property Insurance*

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

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

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

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

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

6.05 *Property Losses; Subrogation*

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

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

1. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils, risks, or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all individuals or entities identified in the Supplementary Conditions as builder's risk or installation floater insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused.
2. None of the above waivers extends to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.

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

1. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from fire or any of the perils, risks, or causes of loss covered by such policies.

C. The waivers in this Paragraph 6.05 include the waiver of rights due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other insured peril, risk, or cause of loss.

D. Contractor shall be responsible for assuring that each Subcontract contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from fire or other peril, risk, or cause of loss covered by builder's risk insurance, installation floater, and any other property insurance applicable to the Work.

6.06 *Receipt and Application of Property Insurance Proceeds*

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

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

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

**ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES**

7.01 *Contractor's Means and Methods of Construction*

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

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

7.02 *Supervision and Superintendence*

A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents.

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

7.03 *Labor; Working Hours*

A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall maintain good discipline and order at the Site.

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

C. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site will be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.04 *Services, Materials, and Equipment*

A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.

B. All materials and equipment incorporated into the Work must be new and of good quality, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications will expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

C. All materials and equipment must be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

7.05 *"Or Equals"*

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

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

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

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

2) will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;

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

4) is not objectionable to Owner.

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

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

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

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

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

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

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

7.06 *Substitutes*

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

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

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

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

    a. will certify that the proposed substitute item will:

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

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

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

    b. will state:

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

        2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item; and

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

    c. will identify:

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

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

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

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

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

D. *Reimbursement of Engineer's Cost*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

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

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

7.07 *Concerning Subcontractors and Suppliers*

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

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

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

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

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

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

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

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

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

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

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

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

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

7.08 *Patent Fees and Royalties*

A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If an invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights will be disclosed in the Contract Documents.

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

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

7.09 *Permits*

A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits, licenses, and certificates of occupancy. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

7.10 *Taxes*

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

7.11 *Laws and Regulations*

A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It is not Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this does not relieve Contractor of its obligations under Paragraph 3.03.

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

7.12 *Record Documents*

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

7.13 *Safety and Protection*

A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations.

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

C. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:

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

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

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

D. All damage, injury, or loss to any property referred to in Paragraph 7.13.C.2 or 7.13.C.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

E. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection.

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

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

H. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.

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

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

7.14 *Hazard Communication Programs*

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

7.15 *Emergencies*

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

7.16 *Submittals*

A. *Shop Drawing and Sample Requirements*

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

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

b. determine and verify:

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

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

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

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

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

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

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

1. *Shop Drawings*

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

b. Data shown on the Shop Drawings must be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide, and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.C.

2. *Samples*

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

b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the Submittal for the limited purposes required by Paragraph 7.16.C.

3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

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

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the accepted Schedule of Submittals. Engineer's review and approval will be only to determine if the items covered by the Submittals will, after installation or incorporation in the Work, comply with the requirements of the Contract Documents, and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction, or to safety precautions or programs incident thereto.

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

4. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will

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

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

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

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

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

D. *Resubmittal Procedures for Shop Drawings and Samples*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous Submittals.

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

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

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

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

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

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

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

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

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

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

7.17 *Contractor's General Warranty and Guarantee*

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer is entitled to rely on Contractor's warranty and guarantee.

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

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

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

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

1. abuse, or improper modification, maintenance, or operation, by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or

2. normal wear and tear under normal usage.

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

1. Observations by Engineer;

2. Recommendation by Engineer or payment by Owner of any progress or final payment;

3. The issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;

4. Use or occupancy of the Work or any part thereof by Owner;

5. Any review and approval of a Shop Drawing or Sample submittal;

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

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

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

9. Any correction of defective Work by Owner.

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

7.18 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from losses, damages, costs, and judgments (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising from third-party claims or actions relating to or resulting from the performance or furnishing of the Work, provided that any such claim, action, loss, cost, judgment or damage is attributable to bodily injury, sickness, disease, or death, or to damage to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom, but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable.

B. In any and all claims against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A will not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

7.19 *Delegation of Professional Design Services*

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

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

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

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

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

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

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

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

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

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

**ARTICLE 8—OTHER WORK AT THE SITE**

8.01 *Other Work*

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

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

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

D. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.

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

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

8.02 *Coordination*

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

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

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

3. The extent of such authority and responsibilities.

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

8.03 *Legal Relationships*

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

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

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

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

C. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

## ARTICLE 9—OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

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

9.02 *Replacement of Engineer*

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

9.03 *Furnish Data*

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

9.04 *Pay When Due*

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

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

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

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

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

9.06 *Insurance*

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

9.07 *Change Orders*

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

9.08 *Inspections, Tests, and Approvals*

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

9.09 *Limitations on Owner's Responsibilities*

A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

9.10 *Undisclosed Hazardous Environmental Condition*

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

9.11 *Evidence of Financial Arrangements*

A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract (including obligations under proposed changes in the Work).

9.12 *Safety Programs*

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

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

## ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

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

10.02 *Visits to Site*

A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe, as an experienced and qualified design professional, the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.07. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Resident Project Representative*

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

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

10.04 *Engineer's Authority*

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

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

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

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

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

10.05 *Determinations for Unit Price Work*

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

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

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

10.07 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, will create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

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

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

D. Engineer's review of the final Application for Payment and accompanying documentation, and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Contractor under Paragraph 15.06.A, will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 10.07 also apply to the Resident Project Representative, if any.

10.08 *Compliance with Safety Program*

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

## ARTICLE 11—CHANGES TO THE CONTRACT

11.01 *Amending and Supplementing the Contract*

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

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

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

11.02 *Change Orders*

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

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

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

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

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

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

11.03 *Work Change Directives*

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

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

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

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

11.04 *Field Orders*

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

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

11.05 *Owner-Authorized Changes in the Work*

A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Changes involving the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters will be supported by Engineer's recommendation.

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

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

11.06 *Unauthorized Changes in the Work*

A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.C.2.

11.07 *Change of Contract Price*

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

B. An adjustment in the Contract Price will be determined as follows:

1. Where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03);

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

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

C. *Contractor's Fee*: When applicable, the Contractor's fee for overhead and profit will be determined as follows:

1. A mutually acceptable fixed fee; or

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

a. For costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee will be 15 percent;

b. For costs incurred under Paragraph 13.01.B.3, the Contractor's fee will be 5 percent;

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

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

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

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

11.08 *Change of Contract Times*

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

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

11.09 *Change Proposals*

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

B. *Change Proposal Procedures*

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

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

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

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

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

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

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

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

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

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

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

11.10 *Notification to Surety*

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

**ARTICLE 12—CLAIMS**

12.01 *Claims*

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

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

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

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

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

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

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

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

D. *Mediation*

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

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

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

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

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

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

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

13.01 *Cost of the Work*

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

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

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

B. *Costs Included*: Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work will be in amounts no higher than those commonly incurred in the locality of the Project, will not include any of the costs itemized in Paragraph 13.01.C, and will include only the following items:

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor in advance of the subject Work. Such employees include, without limitation, superintendents, foremen, safety managers, safety representatives, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work will be apportioned on the basis of their time spent on the Work. Payroll costs include, but are not limited to, salaries and wages plus the cost of fringe benefits, which include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, will be included in the above to the extent authorized by Owner.

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

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, which will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee will be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.

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

5. Other costs consisting of the following:

a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.

b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, which are

consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

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

c. *Construction Equipment Rental*

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

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

3) With respect to Work that is the result of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price ("changed Work"), included costs will be based on the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, must cease to accrue when the use thereof is no longer necessary for the changed Work.

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

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

f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of builder's risk or other property insurance established in accordance with Paragraph 6.04), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses will be included in the Cost of the Work for the purpose of determining Contractor's fee.

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

h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.

i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.

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

1. Payroll costs and other compensation of Contractor's officers, executives, principals, general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.

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

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

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

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

6. Expenses incurred in preparing and advancing Claims.

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

D. *Contractor's Fee*

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

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

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

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

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

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

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

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

13.02 *Allowances*

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

B. *Cash Allowances*: Contractor agrees that:

1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment for any of the foregoing will be valid.

C. *Owner's Contingency Allowance*: Contractor agrees that an Owner's contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor for Work covered by allowances, and the Contract Price will be correspondingly adjusted.

13.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.

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

D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision

thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, and the final adjustment of Contract Price will be set forth in a Change Order, subject to the provisions of the following paragraph.

E. *Adjustments in Unit Price*

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

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

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

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

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

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

14.01 *Access to Work*

A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply with such procedures and programs as applicable.

14.02 *Tests, Inspections, and Approvals*

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

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

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

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

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

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

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

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

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

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

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

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

14.03 *Defective Work*

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

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

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

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

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

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

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

14.04 *Acceptance of Defective Work*

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

14.05 *Uncovering Work*

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

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

C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.

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

2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work,

or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work will not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

14.07 *Owner May Correct Defective Work*

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

B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.

C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

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

15.01 *Progress Payments*

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

B. *Applications for Payments*

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents.

2. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment must also be accompanied by: (a) a bill of sale, invoice, copies of subcontract or purchase order payments, or other documentation

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

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

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

C. *Review of Applications*

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

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

   a. the Work has progressed to the point indicated;

   b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and

   c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

   a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or

   b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

    a. to supervise, direct, or control the Work;

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

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

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

    e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.

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

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

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

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

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

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

D. *Payment Becomes Due*

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

E. *Reductions in Payment by Owner*

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

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

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

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

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

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

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

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

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

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

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

k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens; or

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

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

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

15.02 *Contractor's Warranty of Title*

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

15.03 *Substantial Completion*

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time

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

B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.

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

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

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

F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without

significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. At any time, Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through 15.03.E for that part of the Work.

2. At any time, Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.04 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

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

15.06 *Final Payment*

A. *Application for Payment*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents (as provided in Paragraph 7.12), and other documents, Contractor may make application for final payment.

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

   a. all documentation called for in the Contract Documents;

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

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

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

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

3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

B. *Engineer's Review of Final Application and Recommendation of Payment*: If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within 10 days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the final Application for Payment to Owner for payment. Such recommendation will account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Notice of Acceptability*: In support of its recommendation of payment of the final Application for Payment, Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to stated limitations in the notice and to the provisions of Paragraph 15.07.

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

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

15.07 *Waiver of Claims*

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

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

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

15.08 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the Supplementary Conditions or the terms of any applicable special guarantee required by the Contract Documents), Owner gives Contractor written notice that any Work has been found to be defective, or that Contractor's repair of any damages to the Site or adjacent areas has been found to be defective, then after receipt of such notice of defect Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

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

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

C. If, after receipt of a notice of defect within 60 days and within the correction period, Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others). Contractor's failure to pay such costs, losses, and damages within 10 days of invoice from Owner will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the failure to pay.

D. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.

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

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

**ARTICLE 16—SUSPENSION OF WORK AND TERMINATION**

16.01 *Owner May Suspend Work*

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times directly attributable to any such suspension. Any Change Proposal seeking such adjustments must be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

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

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment, or failure to adhere to the Progress Schedule);

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

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

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

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

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

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

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

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

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

attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.

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

16.03 *Owner May Terminate for Convenience*

A. Upon 7 days' written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

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

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

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

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

16.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon 7 days' written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, 7 days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The

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

## ARTICLE 17—FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

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

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

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

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

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

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

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

## ARTICLE 18—MISCELLANEOUS

18.01 *Giving Notice*

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

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

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

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

18.02 *Computation of Times*

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

18.03 *Cumulative Remedies*

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

18.04 *Limitation of Damages*

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

18.05 *No Waiver*

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

18.06 *Survival of Obligations*

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

18.07 *Controlling Law*

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

18.08 *Assignment of Contract*

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

18.09 *Successors and Assigns*

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

18.10 *Headings*

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

# DOCUMENT 00 73 00

# SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract, Section 00 72 43, (EJCDC C–700, 2018 Edition) and other provisions of the Contract Documents as indicated below. All provisions that are not so amended or supplemented remain in full force and effect.

SC–1 The terms used in these Supplementary Conditions which are defined in the Standard General Conditions of the Construction Contract, Section 00 72 43, (EJCDC C–700, 2018 Edition) have the meanings assigned to them in the General Conditions.

SC–2.05.A.4 Add the following new paragraph to the General Conditions after paragraph 2.05.A.3:

4. "A schedule of anticipated shipping dates for materials and equipment. It is intended that equipment and materials be so scheduled as to arrive at the job site just prior to time for installation to prevent excessive materials on hand for inventory and necessity for extensive storage facilities at the job site."

SC–5.04.B.7 Add the following new paragraph to the General Conditions after paragraph 5.04.B.6:

7. Bonding surety shall be located in the state in which the work is being performed.

The Contractor shall not commence work under this contract until it has obtained all the insurance required under this paragraph and such insurance has been accepted by the Owner, nor shall the Contractor allow any Subcontractor to commence work on its subcontract until the insurance required of the Subcontractor has been so obtained and accepted.

a. Compensation and Employer's Liability Insurance: The Contractor shall take out and maintain during the life of the contract, the statutory Worker's Compensation and Employer's Liability Insurance for all of its employees to be engaged in work on the project under the contract and, in case such work is sublet, the Contractor should require the Subcontractor similarly to provide Worker's Compensation and Employer's Liability Insurance for all the latter's employees to be engaged in such work.

b. Bodily Injury Liability and Property Damage Liability Insurance: The Contractor shall take out and maintain during the life of the contract, Bodily Injury Liability and Property Damage Liability Insurance. The policy shall protect Contractor and any Subcontractor performing work covered by the contract from claims for damages or personal injury, including accidental death, a well as from claims for property damage, which may arise from

operations under the contract, whether such operations be by Contractor, Subcontractor, or by anyone directly or indirectly employed by either of them and the amount of such insurance should be not less than:

(1) Bodily Injury Liability Insurance, in an amount not less than $1,000,000.00 for injuries, including wrongful death to any one person and subject to the same limit for each person in an amount not less than $2,000,000.00 on account of one accident. Contractual liability should be endorsed on the policy.

(2) Property Damage Insurance in an amount not less than $1,000,000.00 for damages on account of any one accident, and in an amount not less than $2,000,000.00 for damages on account of all accidents.

(3) Other Insurance Requirements:
Workers' Compensation - $100,000 each accident
Statutory Coverage and Employer's - $100,000 for each employee
Liability - $500,000 – policy limit
Products-Completed Operations - $1,000,000 – aggregate
Business Auto Liability – Same as Comprehensive General Liability
Excess or Umbrella Liability - $1,000,000

*Colleton County will be named as an "additional insured" party*

c. Builder's Risk Insurance (Fire and Extended Coverage): The Contractor shall have adequate fire and standard extended coverage, with a company or companies acceptable to the Owner, in force on the project.

The provisions with respect to Builder's Risk Insurance shall in no way relieve the Contractor of its obligation of completing the work covered by the Contract.

d. Proof of Carriage of Insurance: The Contractor shall furnish the Owner with certificates showing the type, amount, class of operations, effective dates, and date of expiration of policies. Such certificates shall contain substantially the following statement: "The insurance covered by this certification shall not be canceled or materially altered, except after 10 days written notice has been received by the Owner."

SC–6.02.B Add the following:

The Contractor shall provide in writing any requests to work on weekends. Requests shall be submitted to the Owner and Engineer for consideration a minimum of 48 hours prior to the requested weekend.

SC–6.08 Add the following:

The Contractor shall not proceed until all encroachment permits, curb cut permits, highway crossing permits, and railroad crossing permits have been secured. Contact Owner to ascertain status of permits.

SC–6.09.D Add a new paragraph after paragraph 6.09.C of the General Conditions that reads as follows:

"D. 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 as amended through January 1, 2004 (PL 91–596) and under Section 107 of the Contract Work and Safety Standards Act (PL 91–54). The regulations are administered by the Department of Labor and the Contractor shall allow access to the project to personnel from that Department.

The Bidder's attention is directed to the fact all applicable State laws, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the contract throughout and they will be deemed to be included in the contract the same as though herein written in full.

The Contractor shall keep fully informed of all laws, ordinances and regulations of Federal, State, City and County, in any manner affecting those engaged or employed in the work, or the materials used in the work, or in any way affecting the conduct of the work, and of all orders and decrees of bodies or tribunals having any jurisdiction or authority over same. Contractor shall at all times, observe and comply with all such existing and future laws, ordinances, and regulations."

SC–6.12.B Add a new paragraph after paragraph 6.12.A of the General Conditions that is to read as follows:

"B. Record Data Drawings:

1. The Contractor shall keep accurate, legible records of the elevations, locations, types, and sizes of sanitary sewage lines, service laterals, manholes, cleanouts, water lines, fittings, valves, hydrants, drainage pipes, drainage structures, and other related work performed under this project. Where proposed and existing utilities cross, the Contractor shall measure and record the horizontal location and vertical separation between each crossing. Separation shall be measured between exteriors of pipes. On a set of project prints provided by the Owner, the Contractor shall prepare a set of "record" drawings from the data stated above. The horizontal locations of all portions of items installed on this project shall be accurately tied down to the State Plane Coordinate System. Invert and frame elevations of all manholes, storm sewers and structures, sanitary sewers and lift stations shall be clearly indicated. These "record" drawings shall be kept clean and dry and maintained in a current state with the progress of

the work. If at any time, a copy of this plan or portion of it is requested by the Owner, such copy shall be made available within 24 hours after the request is made.

2. Before final acceptance of the completed installation and before final payment by the Owner, the Contractor shall deliver to the Engineer a completed set of "record" drawings accurately depicting the data described above. The horizontal and vertical locations as shown on the "record" drawings for the items installed on this project shall be certified by a licensed surveyor, other than Thomas & Hutton, registered in the State in which the project is located. "Record" Drawings shall be submitted on a marked up set of project construction prints or electronically. Thomas & Hutton shall prepare original "record" drawings from the submitted data. When completed, Thomas & Hutton shall have the licensed surveyor stamp and sign the original "record" drawings before making copies available to the Owner or other appropriate agencies."

SC–6.13.A.3 Add the following:

"Safely guard the Owner's property from damages, injury, or loss in connection with this contract. Contractor shall at all times guard and protect its own work and all materials of every description both before and after being used in the work.

Contractor shall provide any enclosing or special protection from weather deemed necessary by Engineer without additional cost to the Owner. Partial payments under the contract will not relieve the Contractor from responsibility for protection of material, work, and property."

SC–9.02.C Add a new paragraph after paragraph 9.02.B of the General Conditions that is to read as follows:

"C. If at any time before the commencement or during the progress of the work, tools, plant or equipment appear to the Engineer to be insufficient, inefficient, or inappropriate to secure the quality of the work required or the proper rate of progress, the Engineer may order the Contractor to increase their efficiency, to improve their character, to augment their number, or to substitute new tools, plant or equipment as the case may be, and the Contractor must conform to such order; but a failure of the Engineer to demand such increase or efficiency, number, or improvements, shall not relieve the Contractor's obligation to secure the quality of work and the rate of progress necessary to complete the work within the time required by this contract to the satisfaction of the Owner."

SC–9.05 Add the following sentence at the end of paragraph 9.05 of the General Conditions:

"Owner and Engineer have the right to reject defective materials. Defective materials shall not be used in the work."

SC–13.03.A Add the following sentences to paragraph 13.03.A of the General Conditions:

"The Contractor will be required to maintain all work in a condition acceptable to the Engineer for a 30 day operating period after the same has been completed as a whole, and the Engineer has notified the Contractor in writing that the work has been finished. The Contractor shall give the Project Engineer or Project Representative a minimum of 48 hours notice for all required observations and tests."

END OF SUPPLEMENTARY CONDITIONS

# DOCUMENT 00 80 00

# SPECIAL CONDITIONS

**SC–1 DESCRIPTION OF THE WORK**: The work consists of approximately 11,800 linear feet of 18-inch gravity sewer, 2000 linear feet of 21-inch gravity sewer, 50 manholes and incidental construction in accordance with the plans and specifications.

**SC–2 COMMENCEMENT AND COMPLETION OF WORK**: The Contractor shall commence work within 360 days after Notice to Proceed is issued. Work shall be completed within 390 calendar days no later than June 30, 2026.

If the Contractor fails to prosecute the work with such diligence as will insure the completion of each portion of the work within the time shown on the above schedule, plus any extensions made in accordance with Article 12 of the General Conditions; and, if the Owner does not exercise reservations as set forth in Article 13 of the General Conditions, the Contractor shall continue the work in which event liquidated damages for the delay will be impossible to determine. In lieu thereof, liquidated damages in the amount of $500 per each day of delay of the work until the work is completed.

**SC–3 DRAWINGS**: The work shall conform to the following drawings, all of which form a part of, and are included in, these specifications and are available in the office of Thomas & Hutton Engineering Co., 9705 Hwy 78, Suite 103, Ladson, SC 29456.

| SHEET NO. | TITLE | DATE | FILE NUMBER |
|---|---|---|---|
| CO | COVER SHEET | 1/2/2024 | 29851.0000 |
| GN.01 | GENERAL NOTES & INDEX | 1/2/2024 | 29851.0000 |
| C1.0 | OVERALL SITE PLAN | 1/2/2024 | 29851.0000 |
| C2.0 | GRAVITY SEWER SHEET KEY | 1/2/2024 | 29851.0000 |
| C2.1 | GRAVITY SEWER PLAN & PROFILE | 1/2/2024 | 29851.0000 |
| C2.2 | GRAVITY SEWER PLAN & PROFILE | 1/2/2024 | 29851.0000 |
| C2.3 | GRAVITY SEWER PLAN & PROFILE | 1/2/2024 | 29851.0000 |
| C2.4 | GRAVITY SEWER PLAN & PROFILE | 1/2/2024 | 29851.0000 |
| C2.5 | GRAVITY SEWER PLAN & PROFILE | 1/2/2024 | 29851.0000 |
| C2.6 | GRAVITY SEWER PLAN & PROFILE | 1/2/2024 | 29851.0000 |
| C2.7 | GRAVITY SEWER PLAN & PROFILE | 1/2/2024 | 29851.0000 |
| C2.8 | GRAVITY SEWER PLAN & PROFILE | 1/2/2024 | 29851.0000 |
| C2.9 | GRAVITY SEWER PLAN & PROFILE | 1/2/2024 | 29851.0000 |
| C2.10 | GRAVITY SEWER PLAN & PROFILE | 1/2/2024 | 29851.0000 |
| C2.11 | GRAVITY SEWER PLAN & PROFILE | 1/2/2024 | 29851.0000 |
| C5.0 | UTILITY DETAILS | 1/2/2024 | 29851.0000 |
| C5.1 | UTILITY DETAILS | 1/2/2024 | 29851.0000 |
| EC0.1 | EROSION CONTROL NOTES | 1/2/2024 | 29851.0000 |
| EC0.2 | EROSION CONTROL CHARTS | 1/2/2024 | 29851.0000 |

| | | | |
|---|---|---|---|
| EC1.0 | EROSION CONTROL OVERALL | 1/2/2024 | 29851.0000 |
| EC1.1 | EROSION CONTROL PLAN | 1/2/2024 | 29851.0000 |
| EC1.2 | EROSION CONTROL PLAN | 1/2/2024 | 29851.0000 |
| EC1.3 | EROSION CONTROL PLAN | 1/2/2024 | 29851.0000 |
| EC1.4 | EROSION CONTROL PLAN | 1/2/2024 | 29851.0000 |
| EC1.5 | EROSION CONTROL PLAN | 1/2/2024 | 29851.0000 |
| EC1.6 | EROSION CONTROL PLAN | 1/2/2024 | 29851.0000 |
| EC2.1 | EROSION CONTROL DETAILS | 1/2/2024 | 29851.0000 |
| EC2.2 | EROSION CONTROL DETAILS | 1/2/2024 | 29851.0000 |
| EC2.3 | EROSION CONTROL DETAILS | 1/2/2024 | 29851.0000 |

**SC–4** **LAYOUT OF WORK**: Control lines and master benchmarks will be furnished by the Owner. The Contractor will lay out work and will be responsible for all measurements in connection therewith.

**SC–5** **OBSERVATIONS AND TESTS:** Before acceptance of the whole or any part of the work, it shall be subjected to observation and tests to determine it is in accordance with the plans and specifications. The Contractor will be required to maintain all work in a first class condition for a 30 day operating period after the same has been completed as a whole and the Engineer has notified the Contractor in writing the work has been finished. The Contractor shall pay for all testing and shall engage a mutually acceptable laboratory or qualified individual to conduct the tests in accordance with these specifications. No portion of the work will be accepted until tests prove it has been satisfactorily completed. The Contractor shall give the Project Engineer or Project Representative a minimum of 48 hours notice for all required observations or tests.

**SC–6** **BONDS**: The Performance Bonds in the amount of 100% of the contract amount and Payment Bonds in the amount of 100% of the contract amounts shall be furnished in accordance with Article 5 of the General Conditions.

**SC–7** **CONTRACTOR'S AND SUBCONTRACTOR'S INSURANCE:** The Contractor shall not commence work under this contract until obtaining all the insurance required under this paragraph and such insurance has been accepted by the Owner, nor shall the Contractor allow any Subcontractor to commence work on a subcontract until the insurance required of the Subcontractor has been so obtained and accepted.

a. Compensation and Employer's Liability Insurance: The Contractor shall take out and maintain during the life of the contract the statutory Worker's Compensation and Employer's Liability Insurance for all of its employees to be engaged in work on the project under the contract and, in case and such work is sublet, the Contractor should require the Subcontractor similarly to provide Worker's Compensation and Employer's Liability Insurance for all the latter's employees to be engaged in such work.

b. Bodily Injury Liability and Property Damage Liability Insurance: The Contractor shall take out and maintain during the life of the contract Bodily Injury Liability and Property Damage Liability Insurance to protect itself and any Subcontractor performing work covered by the contract from claims for damages or personal injury, including accidental death, as well as from claims for property damage, which may arise from operations under the

contract, whether such operations be by the Contractor, Subcontractor, or anyone directly or indirectly employed by either of them and the amount of such insurance should be not less than:

(1) Bodily Injury Liability Insurance, in an amount not less than $1,000,000.00 for injuries, including wrongful death to any one person and subject to the same limit for each person in an amount not less than $2,000,000.00 on account of one accident. Contractual liability should be endorsed on the policy.

(2) Property Damage Insurance in an amount not less than $1,000,000.00 for damages on account of any one accident, and in an amount not less than $2,000,000.00 for damages on account of all accidents.

c. Builder's Risk Insurance (Fire and Extended Coverage): The Contractor shall have adequate fire and standard extended coverage, with a company or companies acceptable to the Owner, in force on the project.

The provisions with respect to Builder's Risk Insurance shall in no way relieve the Contractor of its obligation of completing the work covered by the Contract.

d. Proof of Carriage of Insurance: The Contractor shall furnish the Owner with certificates showing the type, amount, class of operations, effective dates, and date of expiration of policies. Such certificates shall contain substantially the following statement: "The insurance covered by this certification shall not be cancelled or materially altered, except after ten (10) days written notice has been received by the Owner."

**SC–8 HOLD HARMLESS CLAUSE**: The Contractor agrees to hold harmless, indemnify and defend the Owner and its agents, architects, engineers and employees from and against any and all claims, losses, damages, demands, causes of action and any an all related costs and expenses, of every kind and character, growing out of, incidental to, or resulting directly or indirectly from the Contractor's performance of the work described herein, whether such loss, damage, injury, or liability is contributed to by the negligence of the Owner, its agents, architects, engineers, or employees, except the Contractor shall have no liability for damages or the costs incidental thereto caused by the sole negligence of the Owner, its agents, architects, engineers, or employees. The Contractor will require any and all subcontractors to conform with the provisions of this clause prior to commencing any work and agrees to ensure this clause is in conformity with the insurance provisions of the contract.

**SC–9 CONTRACTOR'S STATUS:** It is agreed the Contractor shall occupy the status of an Independent Contractor and the Contractor's employees are not employees of the Owner.

**SC–10 CONTRACTOR'S AFFIDAVIT:** Upon completion of the work and prior to final payment and settlement of all sums due hereunder, Contractor will furnish to Owner a Contractor's Affidavit in the usual form submitted by Contractor under the laws of the State of [South Carolina], [Georgia], or [North Carolina] to the effect all bills for labor, materials and services in connection with said contract have been paid in full, acknowledging receipt of the contract price and averring there are no outstanding claims under said contract which could become a lien on the real estate arising out of said contract.

**SC–11 RESIDENT PROJECT ENGINEER:** The Owner reserves the right to furnish a Resident Project Engineer as deemed necessary to insure the Project quality control and conformance to Plans and Specifications, who will act as the Owner's Representative on the Project and will have the authority of the Engineer as set forth in the Contract Documents.

**SC–12 BARRICADES, DANGER AND WARNING SIGNS:** The Contractor shall install and maintain barricades, suitable and sufficient lights, danger signals, signs, and other traffic control devices and shall take all necessary precautions for the protection of the work and safety of the public. Lanes closed to traffic shall be protected by effective barricades, lighted during hours of darkness. Suitable warning signs shall be provided to control, direct traffic, and warn pedestrians. Upon completion all barricades, signs and the like shall be removed.

**SC–13 TOOLS, PLANT AND EQUIPMENT:** If at any time before the commencement or during the progress of the work, tools, plant or equipment appear to the Engineer to be insufficient, inefficient or inappropriate to secure the quality of the work required or the proper rate of progress, the Engineer may order the Contractor to increase their efficiency, to improve their character, to augment their number, or to substitute new tools, plant, or equipment, as the case may be, and the Contractor must conform to such order; but a failure of the Engineer to demand such increase of efficiency, number, or improvement shall not relieve the Contractor of its obligation to secure the quality of work and the rate of progress necessary to complete the work within the time required by the contract to the satisfaction of the Owner.

**SC–14 ACCIDENTS:** The Contractor shall provide, at the site, such equipment and medical facilities as are necessary to supply first–aid service to anyone who may be injured in connection with the work. The Contractor must report in writing to the Engineer all accidents whatsoever arising out of, or in connection with, the performance of the work, whether on or adjacent to the site, which causes death, personal injury or property damages, giving full details and statement of witnesses. In addition, if death or serious injuries or serious damages are caused, the accident shall be reported immediately by telephone or messenger to both the Contractor and any subcontractor on account of any accident, the Contractor shall promptly report the facts to the Engineer, giving full details in writing of the claim. The Contractor shall advise its superintendent and foreman, who are on the site of the work, the name of the hospital and phone number and the name and phone number of the doctor to use in case of an accident.

**SC–15 SANITARY PROVISIONS:** The Contractor shall provide temporary sanitary facilities for the use of the workmen during the progress of the work. The sanitary facilities shall conform to the requirements of the County health Engineer. All facilities shall be removed at the completion of the contract.

**SC–16 MODIFICATION OF QUANTITIES:** The itemized quantities shall be considered by the Contractor as the quantities required to complete the work for the purpose of bidding. Should actual quantities required in the construction of the work be greater or less than the quantities shown on the items, an amount equal to the difference in quantities at the unit prices for the item will be added to or deducted from the contract price.

When itemized quantities are not given in the Proposal, the work shown on the plans or specified shall be considered by the Contractor to be included in the contract for the lump sum prices bid.

**SC–17 RESPONSIBILITY REGARDING EXISTING UTILITIES AND STRUCTURES:** The existence and location of underground utilities will be investigated and verified in the field by the Contractor before starting work. The Contractor shall call for underground utility locations. Underground utilities location service can be contacted at 1–888–721–7877 or 811. The location of all known interferences based on the best information available has been shown on the drawings, but this information may not be complete. Excavation in the vicinity of existing structures and utilities shall be carefully done by hand. The Contractor shall be held responsible for any damage to and for maintenance and protection of existing utilities and structures. The Contractor is responsible for coordinating with the utility companies any relocation, adjustment, or replacement of utility facilities.

**SC–18 INTERRUPTION OF UTILITY SERVICE:** The Contractor's operations shall be conducted to interfere as little as possible with utility services. Any proposed interruption by the Contractor must be accepted in advance by the Engineer.

**SC–19 OMISSION:** The drawings and specifications shall both be considered as a part of the contract. Any work and material shown in the one and omitted in the other, or described in the one and not shown in the other, or which may fairly be implied by both or either, shall be furnished and performed as though shown in both, in order to give a complete and first class job.

**SC–20 MEASUREMENT AND PAYMENT:** Measurement and payment shall be made for the units and at the lump sum contract prices shown on the Bid Schedule. Direct payment shall only be made for those items or work specifically listed in the proposal and the cost of any other work must be included in the contract price for the applicable items to which it relates.

**SC–21 "OR EQUIVALENT," CLAUSE:** Although the plans and specifications make reference to particular manufacturers and model numbers for various products, such reference is made only to establish function and quality of such products. If it is desired to use materials or equipment of trade names or of manufacturer's names that are different from those mentioned in the contract documents, information pertaining to such items must reach the hands of the Engineer at least 10 days prior to the date set for the opening of bids. The burden of proving equality of a proposed substitute to an item designated by trade name or by manufacturer's name in the contract document rests on the party submitting the request for acceptance. The written application for review of a proposed substitute must be accompanied by technical data that the party requesting review desires to submit in support of its application. The Engineer will give consideration to reports from reputable independent testing laboratories, verified experience records showing the reputation of the proposed product with previous users or any other written information that is reasonable in the circumstances. The application to the Engineer for review of a proposed substitute must be accompanied by a schedule setting forth in what respects the material or equipment submitted for consideration differs from the materials or equipment designated in the contract documents. The degree of proof required for acceptance of a proposed substitute as equivalent to a named product is the amount of proof necessary to convince the Engineer beyond all doubt. To be acceptable, a proposed substitute must, in addition, meet or exceed all express requirements of the contract documents.

If submittal is accepted by the Engineer, an addendum will be issued to all prospective bidders at least five days prior to the date set for the opening of bids.

The Engineer shall be the final judge on questions of similarity and equality.

**SC–22 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 as amended through January 1, 2004 (PL 91–596) and under Section 107 of the Contract Work and Safety Standards Act (PL 91–54). The regulations are administered by the Department of Labor and the Contractor shall allow access to the project to personnel from that Department.

**SC–23 RECORD DATA AND DRAWINGS:** The Contractor shall keep accurate, legible records of the locations, types, and sizes of sanitary lines, service laterals, manholes, cleanouts, water lines, fittings, valves, hydrants, drainage pipes, drainage structures, and other related work performed under this project. Where proposed and existing utilities cross, the Contractor shall measure and record the horizontal location and vertical separation between each crossing. Separation shall be measured between exteriors of pipes. On a set of project prints provided by the Owner, the Contractor shall prepare a set of "record" drawings from the data stated above. The horizontal locations of all portions of items installed on this project shall be accurately tied down to features that are physical and visible, such as property corner markers and/or permanent type structures. Invert elevations of all manholes, storm sewers and structures, sanitary sewers and lift stations shall be clearly indicated. These "record" drawings shall be kept clean and dry and maintained in a current state with the progress of the work. If at any time, a copy of this plan or portion of it is requested by the Owner, such copy shall be made available within 24 hours after the request is made.

Before final acceptance of the completed installation and final payment by the Owner, the Contractor shall deliver to the Engineer, four sets of "Record" Drawings accurately depicting the horizontal and vertical as–built data described in the above paragraph. "Record" drawings for the items installed on this project shall be certified by a licensed surveyor, other than Thomas & Hutton, registered in South Carolina. The size of the drawings shall be 24" x 36". The "Record" drawings shall have a coordinate system based on the South Carolina State Plane Coordinate System, East Zone, North American Datum of 1983 (NAD83). Elevations shall be based on the North American Vertical Datum of 1988 (NAVD 88). All measurements and coordinates shown shall use the U.S. Survey flood definition. Coordinates shall be shown on all drainage structures, sanitary sewer manholes, storm manholes/boxes, valve boxes/vaults, valve manholes, valves, fire hydrants, fittings, and all other related work performed under this contract. Vertical data including but not limited to, structure and manhole frame and inverts, pipe inverts, lift station frame, inverts, control levels, bottom, site grading, and as–built grading shall be shown. In addition to the "Record" drawings, Contractor shall deliver to Engineer electronic AutoCAD (v. 14 or later) files of all the data described above on a CD–ROM.

**SC–24 PROPERTY CORNERS:** The Contractor shall be responsible for restoring any property corners or monuments disturbed during construction. They shall be restored by a professional surveyor registered in the State of South Carolina.

**SC–25 VIDEO:** A video showing existing site conditions shall be made by the Contractor prior to start of construction. Contractor shall provide Owner and Engineer a copy of the video. Contractor is encouraged to record any existing damaged facilities that could be questioned later by property owners. A written or recorded narrative shall be provided with the video. Engineer shall be notified 72 hours in advance making the video. Contractor is

responsible for all costs associated with video and shall be considered a subsidiary part of the contract.

**SC–26 CONTRACT PROVISIONS UNDER FEDERAL AWARDS:**

The contract contains these applicable provisions:

A. Termination for Cause and Convenience

The contract may be terminated in whole or in part as follows:

1. By the Grantee, if a contractor fails to comply with the terms and conditions of the SCIIP award;

2. By the Grantee, to the greatest extent authorized by law, if an award no longer effectuates the program goals or agency priorities;

3. By the Grantee with the consent of the contractor, in which case the two parties must agree upon the termination conditions, including the effective date and, in the case of partial termination, the portion to be terminated;

4. By the Grantee upon written notification setting forth the reasons for such termination, the effective date, and, in the case of partial termination, the portion to be terminated. However, if the Grantee determines in the case of partial termination that the reduced or modified portion of the contract will not accomplish the purposes for which the contract was made, the Grantee may terminate the contract in its entirety; or

5. By the Grantee pursuant to termination provisions included in the SCIIP award.

B. Administrative, Contractual, and Legal Remedies

In addition to any of the remedies described elsewhere in the contract, if the contractor materially fails to comply with the terms and conditions of this contract, including any federal or state statutes, rules or regulations, applicable to this contract, RIA or the Grantee may take one or more of the following actions:

1. Temporarily withhold payments pending correction of the deficiency by the contractor;

2. Disallow (that is, deny both use of funds and any applicable matching credit for) all or part of the cost of the activity or action not in compliance;

3. Wholly or partly suspend or terminate this Contract; and

4. Take other remedies that may be legally available.

The remedies identified above, do not preclude the contractor from being subject to debarment and suspension under Presidential Executive Orders 12549 and 12689. The Grantee shall have the right to demand a refund, either in whole or part, of the

funds provided to the contractor for noncompliance with the terms of this Contract.

C. Debarment and Suspension (Executive Orders 12549 and 12689)

1. The Contractor certifies that it is not listed on the government-wide exclusions in SAM, in accordance with the OMB guidelines at 2 CFR 180 and 2 CF 1200 that implement Executive Orders 12549 (3 CFR part 1986 Comp., p. 189) and 12689 (3 CFR part 1989 Comp., p. 235), "Debarment and Suspension."

D. Equal Employment Opportunity.

During the performance of this contract, the contractor agrees as follows:

1. The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following:

    a. Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause. The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.

2. The contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the contractor's legal duty to furnish information.

3. The contractor will send to each labor union or representative of workers with which he has a collective bargaining contract or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

4. The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

5. The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

6. In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

E. Davis-Bacon Act, as amended (40 U.S.C. 3141-3148).

1. The Contractor must comply with the Davis-Bacon Act (40 U.S.C. 3141- 3144, and 3146- 3148) as supplemented by Department of Labor regulations (29 CFR Part 5, "Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction"). In accordance with the statute, contractors must pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor. In addition, contractors must pay wages not less than once a week.

2. The Contractor must comply with the Copeland "Anti-Kickback" Act (40 U.S.C. 3145), as supplemented by Department of Labor regulations (29 CFR Part 3, "Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States"). The Act provides that each Contractor or subcontractor must be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled.

F. Contract Work Hours and Safety Standards Act (40 U.S.C. 3701-3708).

1. The Contractor must comply with 40 U.S.C. 3702 and 3704, as supplemented by Department of Labor regulations (29 CFR Part 5). Under 40 U.S.C. 3702 of the Act, each Contractor must be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. Requirements of 40 U.S.C. 3704 are applicable to construction work and

provide that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.

G. Clean Air Act (42 U.S.C. 7401-7671q.) and the Federal Water Pollution Control Act (33 U.S.C. 1251-1387), as amended—Where applicable the Contract require compliance with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. 1251-1387). Violations must be reported to the Federal awarding agency and the Regional Office of the Environmental Protection Agency (EPA).

H. Byrd Anti-Lobbying Amendment (31 U.S.C. 1352)—Contractors that apply or bid for an award exceeding $100,000 must file the required certification. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. 1352. Each tier must also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the non-Federal award.

I. Contracting with small and minority businesses, women's business enterprises, and labor surplus area firms.

The prime contractor, if subcontracts are to be let, shall take the affirmative steps listed in items 1 through 5 below:

1. Placing qualified small and minority businesses and women's business enterprises on solicitation lists.

2. Assuring that small and minority businesses, and women's business enterprises are solicited whenever they are potential sources.

3. Dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by small and minority businesses, and women's business enterprises.

4. Establishing delivery schedules, where the requirement permits, which encourage participation by small and minority businesses, and women's business enterprises.

5. Using the services and assistance, as appropriate, of such organizations as the Small Business Administration and the Minority Business Development Agency of the Department of Commerce; and

Prime contractor shall provide a certification statement to Owner that these above steps were taken. The target participation percentage is 5%.

**INDEX TO**

**SECTION 01 11 00**

**SUMMARY OF WORK**

**INDEX TO**

**SECTION 01 11 00**

**SUMMARY OF WORK**

# SECTION 01 11 00

# SUMMARY OF WORK

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Contract Description.

B. Work required by Contract.

C. Contract Drawings.

D. Contract Technical Specifications.

### 1.2 CONTRACT DESCRIPTION

A. Contract Type: 00 52 43 – Agreement Form – Unit Price (Single – Prime Contract)

### 1.3 WORK REQUIRED

A. Consists of Contractor furnishing all labor, materials, tools, equipment and incidentals to complete the Work generally described below:

1. Installation of approximately 11,600 LF of 18-inch gravity sewer.
2. Installation of approximately 2,000 LF of 21-inch gravity sewer.
3. Installation of approximately 50 manholes.

B. All work shall be performed as shown on the Drawings and as described in the Contract Documents and Technical Specifications.

C. All work shall comply with standards described by the Department of Labor, Occupational Safety and Health Administration, 29 CFR Part 1926, Subpart P, latest revision.

### 1.4 CONTRACT DRAWINGS

| SHEET NO. | TITLE | DATE | FILE NUMBER |
|---|---|---|---|
| CO | COVER SHEET | 1/2/2024 | 29851.0000 |
| GN.01 | GENERAL NOTES & INDEX | 1/2/2024 | 29851.0000 |
| C1.0 | OVERALL SITE PLAN | 1/2/2024 | 29851.0000 |
| C2.0 | GRAVITY SEWER SHEET KEY | 1/2/2024 | 29851.0000 |
| C2.1 | GRAVITY SEWER PLAN & PROFILE | 1/2/2024 | 29851.0000 |
| C2.2 | GRAVITY SEWER PLAN & PROFILE | 1/2/2024 | 29851.0000 |
| C2.3 | GRAVITY SEWER PLAN & PROFILE | 1/2/2024 | 29851.0000 |
| C2.4 | GRAVITY SEWER PLAN & PROFILE | 1/2/2024 | 29851.0000 |
| C2.5 | GRAVITY SEWER PLAN & PROFILE | 1/2/2024 | 29851.0000 |

| SHEET NO. | TITLE | DATE | FILE NUMBER |
|---|---|---|---|
| C2.6 | GRAVITY SEWER PLAN & PROFILE | 1/2/2024 | 29851.0000 |
| C2.7 | GRAVITY SEWER PLAN & PROFILE | 1/2/2024 | 29851.0000 |
| C2.8 | GRAVITY SEWER PLAN & PROFILE | 1/2/2024 | 29851.0000 |
| C2.9 | GRAVITY SEWER PLAN & PROFILE | 1/2/2024 | 29851.0000 |
| C2.10 | GRAVITY SEWER PLAN & PROFILE | 1/2/2024 | 29851.0000 |
| C2.11 | GRAVITY SEWER PLAN & PROFILE | 1/2/2024 | 29851.0000 |
| C5.0 | UTILITY DETAILS | 1/2/2024 | 29851.0000 |
| C5.1 | UTILITY DETAILS | 1/2/2024 | 29851.0000 |
| EC0.1 | EROSION CONTROL NOTES | 1/2/2024 | 29851.0000 |
| EC0.2 | EROSION CONTROL CHARTS | 1/2/2024 | 29851.0000 |
| EC1.0 | EROSION CONTROL OVERALL | 1/2/2024 | 29851.0000 |
| EC1.1 | EROSION CONTROL PLAN | 1/2/2024 | 29851.0000 |
| EC1.2 | EROSION CONTROL PLAN | 1/2/2024 | 29851.0000 |
| EC1.3 | EROSION CONTROL PLAN | 1/2/2024 | 29851.0000 |
| EC1.4 | EROSION CONTROL PLAN | 1/2/2024 | 29851.0000 |
| EC1.5 | EROSION CONTROL PLAN | 1/2/2024 | 29851.0000 |
| EC1.6 | EROSION CONTROL PLAN | 1/2/2024 | 29851.0000 |
| EC2.1 | EROSION CONTROL DETAILS | 1/2/2024 | 29851.0000 |
| EC2.2 | EROSION CONTROL DETAILS | 1/2/2024 | 29851.0000 |
| EC2.3 | EROSION CONTROL DETAILS | 1/2/2024 | 29851.0000 |

### 1.5 CONTRACT TECHNICAL SPECIFICATIONS

| TECHNICAL PROVISIONS | |
|---|---|
| 31 00 00 | Earthwork |
| 31 10 00 | Site Clearing |
| 31 25 00 | Erosion and Sedimentation Control |
| 31 37 00 | Rip–Rap |
| 32 11 23 | Aggregate Base Courses |
| 32 11 26 | Asphaltic Base Course |
| 32 12 16 | Asphalt Paving |
| 32 92 00 | Turf and Grasses |
| 33 01 30.73 | Sewer Utilities Pipe Bursting |
| 33 30 00 | Sanitary Sewerage Utilities |

## PART 2 – PRODUCTS

Not used

## PART 3 – EXECUTION

Not used

END OF SECTION

# SECTION 01 22 00

# UNIT PRICES

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Criteria applicable to the Work performed under a unit price payment method.

### 1.2 AUTHORITY

A. Measurement methods delineated in the individual specification sections complement the criteria of this section. In the event of conflict, the requirements of the individual specification section govern.

B. Take all measurements and compute quantities. The Engineer will verify measurements and quantities.

C. Assist by providing necessary equipment, workers, and survey personnel as required.

### 1.3 UNIT QUANTITIES SPECIFIED

A. Quantities indicated in the Bid Form are for bidding and contract purposes only. Quantities and measurements supplied or placed in the Work and verified by the Engineer determine payment.

B. If the actual Work requires more or fewer quantities than those quantities indicated, provide the required quantities at the unit sum/prices contracted.

### 1.4 MEASUREMENT OF QUANTITIES

A. Measurement by Weight: Concrete reinforcing steel, rolled or formed steel or other metal shapes will be measured by handbook weights. Welded assemblies will be measured by handbook or scale weight.

B. Measurement by Volume: Measured by cubic dimension using mean length, width and height or thickness.

C. Measurement by Area: Measured by square dimension using mean length and width or radius.

D. Linear Measurement: Measured by linear dimension, at the item centerline or mean chord.

E. Stipulated Sum/Price Measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as a completed item or unit of the Work.

## 1.5 PAYMENT

A. Payment Includes: Full compensation for all required labor, products, tools, equipment, plant, transportation, services, and incidentals; erection, application or installation of an item of the Work including overhead and profit.

B. Final payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities accepted by the Engineer multiplied by the unit sum/price for Work which is incorporated in or made necessary by the Work.

## PART 2 – PRODUCTS

Not Used

## PART 3 – EXECUTION

Not Used

END OF SECTION

**INDEX TO**

**DIVISION I – GENERAL REQUIREMENTS**

**SECTION 01 33 00**

**SUBMITTAL PROCEDURES**

# DIVISION I – GENERAL REQUIREMENTS

# SECTION 01 33 00

# SUBMITTAL PROCEDURES

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Submittal procedures.

B. Construction progress schedules.

C. Product Data.

D. Shop Drawings.

E. Samples.

F. Design data.

G. Test reports.

H. Certificates.

I. Manufacturer's instructions.

J. Manufacturer's field reports.

K. Erection drawings.

### 1.2 RELATED SECTIONS

A. Section 01 45 00 – Quality Control: Manufacturers' field services and reports.

B. Section 01 77 00 – Closeout Procedures: Contract warranties, bonds, manufacturers' certificates, and closeout submittals.

### 1.3 SUBMITTAL PROCEDURES

A. Transmit each submittal with Engineer accepted form.

B. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix. Resubmit as specified for initial submittal. Indicate on revised drawings all changes that have been made other than those requested by the Engineer.

C. Identify Project, Contractor, Subcontractor, or supplier; pertinent drawing and detail number, and specification section number, as appropriate.

D. Apply Contractor's stamp, signed or initialed verifying review, approval, products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents. Submittal without the Contractor's stamp will be returned to Contractor without Engineer's review.

E. Make all submittals far enough in advance of scheduled dates for installation to provide all required time for reviews, for securing necessary approvals, for possible revision and resubmittal, and for placing orders and securing delivery. In scheduling, allow sufficient time for the Engineer's review following the receipt of the submittal. Coordinate submission of related items. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.

F. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed Work.

G. Provide space for Contractor and Architect/Engineer review stamps.

H. When revised for resubmission, identify all changes made since previous submission.

I. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.

## 1.4 CONSTRUCTION PROGRESS SCHEDULES

A. Submit initial schedule in duplicate within 15 20 days after date of Owner–Contractor Agreement.

B. Revise and resubmit as required.

C. Submit revised schedules with each Application for Payment, identifying changes since previous version.

D. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration.

E. Indicate estimated percentage of completion for each item of Work at each submission.

F. Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates, including those furnished by Owner and required by allowances.

## 1.5 PRODUCT DATA

A. Product Data For Review:

1. Submitted to Engineer for review and conformance with information given in specifications and the design concept expressed in contract documents.

2. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article above.

B. Submit the number of copies Contractor and Owner require, plus two copies retained by Engineer.

C. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

D. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

E. After review, distribute in accordance with the Submittal Procedures article above.

**1.6 SHOP DRAWINGS**

A. Contractor shall submit a minimum 6 copies of each shop drawing to the Engineer for review.

B. Submitted to Engineer for review and conformance with information given in specifications and design concept expressed in contract documents. Review of shop drawings by Engineer shall not relieve Contractor of its responsibility for accuracy of shop drawings nor for furnishing of all materials and equipment required by the contract even though such items may not be indicated on shop drawings reviewed by Engineer.

C. Shop drawings shall include applicable technical information, drawings, diagrams, performance curves, schedules, templates, calculations, instructions, measurements, and similar information as applicable to the specific item for which shop drawing is prepared.

D. Do <u>not</u> use Engineer's Drawings for shop or erection purposes.

E. Each shop drawing copy shall bear a Contractor's stamp showing they have been checked. Shop drawings submitted to the Engineer without Contractor's stamp will be returned to Contractor without review.

No review will be given to partial submittals of shop drawings for items which interconnect and/or are interdependent. It is the Contractor's responsibility to assemble shop drawings for all such interconnecting and/or interdependent items, check them and then make one submittal to Engineer.

Schedule of Submittals: Within 30 days of Contract award and prior to any shop drawing submittal, Contractor shall submit a schedule showing the estimated submittal date and desired acceptance date for each shop drawing anticipated. Time lost due to unacceptable submittals shall be the Contractor's responsibility.

## 1.7 SAMPLES

A. Samples For Review:

1. Submitted to Engineer for review and conformance with information given in specifications and design concept expressed in contract documents.

2. After review, produce duplicates and distribute in accordance with SUBMITTAL PROCEDURES article above.

B. Samples For Information:

1. Submitted for Engineer's knowledge as contract administrator or for the Owner.

C. Include identification on each sample, with full product information.

D. Submit the number of samples specified in individual specification sections; one of which will be retained by Engineer.

E. Reviewed samples which may be used in the Work are indicated in individual specification sections.

F. Samples will not be used for testing purposes unless specifically stated in the specification section.

## 1.8 DESIGN DATA

A. Submit for Engineer's knowledge as contract administrator or for the Owner.

B. Submit for information and conformance with information given in specifications and design concept expressed in contract documents.

## 1.9 TEST REPORTS

A. Submit for Engineer's knowledge as contract administrator or for the Owner.

B. Submit test reports for information and assessing conformance with information given in specifications and design concept expressed in contract documents.

## 1.10 CERTIFICATES

A. When specified in individual specification sections, submit certification by manufacturer, installation/application subcontractor, or the Contractor to Engineer, in quantities specified for Product Data.

B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or product, but must be acceptable to Engineer.

## 1.11 MANUFACTURER'S INSTRUCTIONS

A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, adjusting, and finishing, to Engineer for delivery to Owner in quantities specified for product Data.

B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

C. Refer to Section 01 45 00 – Quality Control, Manufacturers' Field Services article.

## 1.12 MANUFACTURER'S FIELD REPORTS

A. Submit reports for Engineer's benefit as contract administrator or for the Owner.

B. Submit report in duplicate within 30 days of observation to Engineer for information.

C. Submit for information and assessing conformance with information given in specifications and design concept expressed in contract documents.

## 1.13 ERECTION DRAWINGS

A. Submit drawings for Engineer's benefit as contract administrator or for the Owner.

B. Submit for information and assessing conformance with information given in specifications and design concept expressed in contract documents.

C. Data indicating inappropriate or unacceptable Work may be subject to action by the Engineer or Owner.

## 1.14 REVIEWED SHOP DRAWINGS

A. Engineer Review.

1. Acceptable submittals will be marked “No Exceptions Taken.” A minimum of three copies will be retained by the Engineer for Engineer’s and Owner’s use and remaining copies will be returned to Contractor.

2. Submittals requiring minor corrections before the product is acceptable will be marked “Furnish as Corrected.” Contractor may order, fabricate, and ship items included in submittals, provided the indicated corrections are made.

3. Submittals marked “Revise and Resubmit” must be revised to reflect required changes and the initial review procedure repeated.

4. The “Rejected” notation is used to indicate products not acceptable. Upon return of a submittal so marked, Contractor shall repeat the initial review procedure utilizing acceptable products.

5. Only two copies of items marked "Revise and Resubmit" and "Rejected" will be reviewed and marked. One copy will be retained by Engineer and the other copy with all remaining unmarked copies will be returned to Contractor for resubmittal.

B. No Work or products shall be installed without a drawing or submittal bearing the "No Exceptions Taken" or "Furnish as Corrected" notation. Contractor shall maintain at the job site a complete set of shop drawings bearing Engineer's stamp.

C. Substitutions: In the event Contractor obtains Engineer's acceptance for use of products other than those listed first in Contract Documents, Contractor shall, at Contractor's own expense and using methods accepted by Engineer, make any changes to structures, piping and electrical work necessary to accommodate these products.

D. Use of "No Exceptions Taken" or "Furnish as Corrected" notation on shop drawings or other submittals is general and shall not relieve Contractor of the responsibility of furnishing products of proper dimension, size, quality, quantity, materials, all performance characteristics, and to efficiently perform requirements and intent of Contract Documents. Engineer's review shall not relieve Contractor of the responsibility of errors of any kind on shop drawings. Review is intended only to assure conformance with design concept of the project and compliance with information given in Contract Documents.

## 1.15 SUBMITTAL CHECKLIST

A. This checklist is not necessarily complete. Contractor is responsible to submit all items and materials as specified in each section.

| Section | Submittal | Date Received by T & H | Accepted Submittal Returned to Owner/ Contractor | Submittal Rejected & Returned | Comments |
|---|---|---|---|---|---|
| **31 00 00 – Earthwork** | | | | | |
| | Borrow | | | | |
| **31 25 00 – Soil Erosion Control** | | | | | |
| | Silt Fence | | | | |
| **31 37 00 – Rip–Rap** | | | | | |
| | Stone | | | | |
| | Sand–Cement Bag | | | | |
| | Filter Fabric | | | | |

| Section | Submittal | Date Received by T & H | Accepted Submittal Returned to Owner/ Contractor | Submittal Rejected & Returned | Comments |
|---|---|---|---|---|---|
| **32 11 26 – Asphaltic Base Courses** | | | | | |
| | Asphalt Cement | | | | |
| | Anti–Stripping Agent | | | | |
| | Mix Design | | | | |
| **32 12 16 – Asphalt Paving** | | | | | |
| | Tack Coat | | | | |
| | Asphalt Cement | | | | |
| | Anti–Stripping Agent | | | | |
| | Mix Designs | | | | |
| **32 92 00 – Turf and Grasses** | | | | | |
| | Seed Mix – Temporary | | | | |
| | Seed Mix – Permanent | | | | |
| | Fertilizer | | | | |
| | Lime | | | | |
| **33 30 00 – Sanitary Sewage Utilities** | | | | | |
| | Manholes & Interior Coating | | | | |
| | Boots and S.S. Straps | | | | |
| | Joint Wrap | | | | |
| | Joint Sealant | | | | |
| | Steps | | | | |
| | Piping – PVC – Gravity | | | | |
| | Piping – DI – Gravity | | | | |

| Section | Submittal | Date Received by T & H | Accepted Submittal Returned to Owner/ Contractor | Submittal Rejected & Returned | Comments |
|---|---|---|---|---|---|
| | Fittings – PVC – Gravity | | | | |
| | Frames & Covers | | | | |
| | Tracing Wire | | | | |
| | Magnetic Tape | | | | |

**PART 2 – PRODUCTS**

Not Used

**PART 3 – EXECUTION**

Not Used

END OF SECTION

**INDEX TO**

**SECTION 01 45 00 – QUALITY CONTROL**

# SECTION 01 45 00

# QUALITY CONTROL

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Quality assurance – control of installation.

B. Tolerances

C. References and standards.

D. Testing laboratory services.

E. Manufacturer's field services.

### 1.2 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures: Submission of manufacturer's instructions and certificates.

B. Section 01 45 23 – Testing and Inspecting Services.

### 1.3 QUALITY ASSURANCE – 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 manufacturer's instructions, including each step in sequence.

C. Should manufacturer's instructions conflict with Contract Documents, request clarification from Engineer 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. Perform Work by persons qualified to produce required and specified quality.

F. Verify 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, or disfigurement.

### 1.4 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturer's tolerances. Should manufacturer's tolerances conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.

C. Adjust products to appropriate dimensions and position before securing in place.

D. Accessible routes shall not exceed maximum ADA allowable slopes.

**1.5 REFERENCES AND STANDARDS**

A. For products or workmanship specified by association, trade, or other consensus standards, complies with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard by date of issue current with date specified in the individual specification sections, except where a specific date is established by code.

C. Obtain copies of standards where required by product specification sections.

D. Neither the contractual relationships, duties, nor responsibilities of the parties in Contract or those of the Architect/Engineer shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

**1.6 TESTING SERVICES**

A. Contractor will appoint and employ services of an independent firm to perform testing. Contractor shall pay for testing services required by the specifications

B. The independent firm will perform tests and other services specified in individual specification sections and as required by the Owner.

C. Testing and source quality control may occur on or off the project site. Perform off–site testing as required by the Owner.

D. Reports will be submitted by the independent firm to the Engineer and Contractor, in duplicate, indicating observations and results of tests and indicating compliance or non–compliance with Contract Documents.

E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.

1. Notify Architect/Engineer and independent firm 48 hours prior to expected time for operations requiring services.

2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.

F. Testing does not relieve Contractor to perform Work to contract requirements.

G. Re–testing required because of non–conformance to specified requirements shall be performed by the same independent firm on instructions by the Engineer. Payment for re–testing will be made by the Contractor.

## PART 2 – PRODUCTS

Not Used

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. Verify existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

B. Verify existing substrate is capable of structural support or attachment of new Work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Verify utility services are available, of the correct characteristics, and in the correct locations.

### 3.2 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.

END OF SECTION

**INDEX TO**

**SECTION 01 45 23**

**TESTING AND INSPECTING SERVICES**

# SECTION 01 45 23

# TESTING AND INSPECTING SERVICES

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Selection and payment.

B. Contractor submittals.

C. Testing agency responsibilities.

D. Testing agency reports.

E. Limits on testing authority.

F. Contractor responsibilities.

G. Schedule of tests.

### 1.2 RELATED SECTIONS

A. Testing and acceptance required by public authorities.

B. Section 01 33 00 – Submittal Procedures: Manufacturer's certificates.

C. Section 01 77 00 – Closeout Procedures: Project record documents.

### 1.3 REFERENCES (LATEST REVISION)

A. ASTM C 802 – Practice for Conducting an Interlaboratory Test Program to Determine the Precision of Test Methods for Construction Materials.

B. ASTM C 1077 – Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.

C. ASTM C 1093 – Practice for Accreditation of Testing Agencies for Masonry.

D. ASTM D 3740 – Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

E. ASTM D 4561 – Practice for Quality Control Systems for Organizations Producing and Applying Bituminous Paving Materials.

F. ASTM E 329 – Specification for Agencies Engaged in Construction Inspection and/or Testing.

G. ASTM E 543 – Practice for Agencies Performing Nondestructive Testing.

H. ASTM E 548 – Guide for General Criteria Used for Evaluating Laboratory Competence.

I. ASTM E 699 – Practice for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating of Building Components.

## 1.4 SELECTION AND PAYMENT

A. Employment and payment by Contractor for services of an independent testing agency or laboratory to perform specified testing.

B. Employment of testing agency or laboratory in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

## 1.5 QUALITY ASSURANCE

A. Comply with requirements of practices listed in paragraph 1.3.

B. Laboratory: Authorized to operate in State in which project is located.

C. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.

D. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants.

## 1.6 CONTRACTOR SUBMITTALS

A. Prior to start of Work, submit testing laboratory name, address, and telephone number, and names of full time registered Engineer and responsible officer.

B. Submit copy of report of laboratory facilities inspection made by Materials Reference Laboratory of National Bureau of Standards during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.

## 1.7 TESTING AGENCY RESPONSIBILITIES

A. Test samples of mixes submitted by Contractor.

B. Provide qualified personnel at site. Cooperate with Engineer and Contractor in performance of services.

C. Perform specified sampling and testing of products in accordance with specified standards.

D. Ascertain compliance of materials and mixes with requirements of Contract Documents.

E. Promptly notify Engineer and Contractor of observed irregularities or non–conformance of Work or products.

F. Perform additional tests required by Engineer.

G. Attend preconstruction meetings and progress meetings.

## 1.8 TESTING AGENCY REPORTS

A. After each test, promptly submit two copies of report to Engineer and to Contractor.

B. Include:

1. Date issued.
2. Project title and number.
3. Name of inspector.
4. Date and time of sampling or inspection.
5. Identification of product and specifications section.
6. Location in the Project.
7. Type of inspection or test.
8. Date of test.
9. Results of tests.
10. Conformance with Contract Documents.

C. When requested by Engineer, provide interpretation of test results.

## 1.9 LIMITS ON TESTING AUTHORITY

A. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.

B. Agency or laboratory may not approve or accept any portion of the Work.

C. Agency or laboratory may not assume any duties of Contractor.

D. Agency or laboratory has no authority to stop the Work.

## 1.10 CONTRACTOR RESPONSIBILITIES

A. Deliver to agency or laboratory at designated location, adequate samples of materials proposed to be used requiring testing, along with proposed mix designs.

Cooperate with laboratory personnel, and provide access to the work.

B. Provide incidental labor and facilities:

1. To provide access to Work to be tested.
2. To obtain and handle samples at the site or at source of products to be tested.
3. To facilitate tests.
4. To provide storage and curing of test samples.

D. Notify Engineer and laboratory 48 hours prior to expected time for operations requiring testing services.

### 1.11 SCHEDULE OF TESTS

| Section | Test | Frequency | Date | Performed By | Notes |
|---|---|---|---|---|---|
| **33 30 00 – Sanitary Sewage Utilities** | | | | | |
| | Start–up | Prior to acceptance of Pump Station | | | |
| | Drawdown | Prior to acceptance of Pump Station | | | |
| | Certification | Completion | | | |
| | Warranty | Completion | | | |
| | Television Inspection of Sewers | As requested | | | |
| | Leakage | As necessary | | | |
| | Compaction | | | | |
| | Traffic Areas | 1 per 100 lf or less for each 4 ft. of depth | | | |
| | Non–Traffic Areas | 1 per 500 lf or less for each 6 ft. of depth | | | |
| | Gravity – Air | [ All lines ] | | | |
| | Hydrostatic – Force Main | 100 psi for 2 hours | | | |
| | Deflection | 10% of system | | | |

## PART 2 – PRODUCTS

Not Used

## PART 3 – EXECUTION

Not Used

END OF SECTION

**INDEX TO**

**SECTION 01 55 26 – TRAFFIC CONTROL**

# SECTION 01 55 26

# TRAFFIC CONTROL

## PART 1 – GENERAL

### 1.1 DESCRIPTION

A. This section covers furnishing, installation, and maintenance of all traffic control devices, portable signal equipment, warning signs, and temporary traffic lanes used during construction of the project.

### 1.2 RELATED WORK

A. Section 33 30 00 – Sanitary Sewerage Utilities

### 1.3 RESPONSIBILITY

A. The Contractor shall furnish, install, and maintain all necessary automated signals, barricades, concrete traffic barriers, warning signs, traffic barriers, traffic lanes, and other protective devices. Ownership of these temporary warning devices shall remain with the Contractor provided devices are removed promptly after completion and acceptance of work to which devices pertain. If such warning devices are left in place for more than 30 days after specified time for removal, Owner shall have the right to remove such devices and to claim possession thereof.

### 1.4 MEASUREMENT AND PAYMENT

A. There will be no measurement for this item. Payment shall be for the unit lump sum (LS) price included on the bid proposal.

## PART 2 – PRODUCTS

### 2.1 MATERIALS

A. All barricades signs, and traffic control signal devices shall conform to requirements of the current South Carolina Manual on Uniform Traffic Control Devices except as may be modified in these project specifications.

B. Portable traffic control signal devices, barricades, signs and other Control Devices shall be either new or in acceptable condition when first erected on Project and shall remain in acceptable condition throughout the construction period.

B. All signs shall have a black legend and border on an orange reflectorized background and will be a minimum of engineering grade reflective.

## PART 3 – EXECUTION

### 3.1 ERECTION

A. Prior to commencement of any actual construction on the project, Contractor shall erect appropriate advance warning signs and place concrete traffic barriers where necessary. Subsequently, as construction progresses and shifts from one side of road to the other, temporary lanes must be installed to provide continuous two way traffic and bike thoroughfare. All appropriate signs and traffic control devices pertinent to the work shall be erected ahead of construction site to advise and warn travelling public of activity and any necessary detours.

### 3.2 DELAYS TO TRAFFIC

A. Except in rare and unusual circumstances, two–way traffic shall be maintained at all times by temporary and/or permanent roads. There are to be no traffic delays during the hours between 7 AM – 10 AM and 4 PM – 10 PM. Between the hours of 10 AM and 4 PM the maximum delay is to be 15–minutes.

B. When traffic is halted temporarily due to transition procedures including the ingress and egress of construction vehicles, Contractor shall provide necessary flagging personnel with proper equipment and clothing to hold such traffic.

C. If Contractor's proposed traffic control plan involves more than occasional disruption to alternating one way traffic through the work, then temporary, signalized control equipment will be required.

### 3.3 TEMPORARY TRAFFIC LANES

A. Two–lane traffic shall be maintained at all times unless prior written permission has been given and all necessary flagging personnel and/or signage has been installed. Temporary lane line stripes shall be applied to the detour paving, as agreed to by Engineer and Owner's representative. The no–passing double center–line stripes shall be yellow. Such stripes shall be a temporary, degradable, reflectorized tape strip. All temporary striping shall be maintained throughout the period traffic control is needed.

B. Contractor is responsible for installation and removal of all temporary roads and trails throughout the construction process. These detour roads are to be in accordance with the Pavement Specifications herein.

### 3.4 SIGNS AND BARRICADES

A. Contractor shall provide a detailed map showing location and verbiage of all traffic control signs and methods for the project. All critical warning signs for the project will be a minimum of engineering grade reflective material and include appropriate flashing lights.

B. Appropriate Safety Barricades shall be installed between bicycle trails, sidewalks, and the temporary traffic lanes. These barricades shall be impact resistant for passenger vehicles with a travelling speed of 40 mph.

1. Advance warning signs: These signs shall be placed approximately 500 feet in advance of the construction site and detour on each approach to the construction area with subsequent warning signs every 250 feet, until construction site is met.

2. Road Construction Signs: Before and during construction of the detour, advance road construction signs shall be located as already stated above. The construction site detour lanes will have reflective trestle type barricade with flashing lights spaced a maximum of 25 feet apart to delineate each side of any temporary roadway. Additional signage shall be placed to indicate a reduced speed limit of 10 mph for the entire construction area. Other signs as appropriate to a particular activity in the work area shall be erected in advance of that activity.

3. Barricades: While detour is open to traffic, a line of concrete traffic barricades shall be placed across the closed roadway to channelize traffic onto detour. They shall be spaced across the blocked roadway end to end so no vehicle will be able to pass between any two adjacent barricades.

4. Barriers: Shall be wooden having a minimum of three horizontal 6 inch rails spaced 20 inches on center. Markings for barrier rails shall be 6 inches wide alternate orange and white reflectorized stripes sloping downward at 45 degrees in the direction traffic is to pass.

   During hours of darkness, the Contractor shall place and maintain flashing warning lights on tops of all barriers.

5. Direction Arrow Signs: At each change in traffic direction along the detour, Contractor shall install a sign with an arrow indicating change in traffic direction. This sign is to be located across the pavement from and facing on–coming traffic.

6. End Construction Sign: This sign shall be 60 inches x 24 inches and erected approximately 200 feet beyond end of construction area on the right–hand side.

END OF SECTION

**INDEX TO**

**SECTION 01 77 00 – CLOSEOUT PROCEDURES**

# SECTION 01 77 00

# CLOSEOUT PROCEDURES

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Closeout procedures.

B. Project record documents.

C. Operation and maintenance data.

D. Warranties and bonds.

E. Maintenance service.

### 1.2 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures.

B. Operation and Maintenance Data.

C. Warranties.

D. Bonds.

### 1.3 CLOSEOUT PROCEDURES

A. Submit written verification Contract Documents being reviewed, Work has been observed at appropriate times, and Work is complete in accordance with Contract Documents and ready for Engineer's review.

B. Provide submittals to Engineer required by governing or other authorities.

C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

### 1.4 FINAL CLEANING

A. Execute final cleanup prior to final project assessment.

B. Remove waste and surplus materials, rubbish, and construction facilities from the site.

## 1.5 ADJUSTING

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

## 1.6 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:

1. Drawings.
2. Specifications.
3. Addenda.
4. Change Orders and other modifications to the Contract.
5. Reviewed Shop Drawings, Product Data, and Samples.
6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Equipment Specifications: Legibly mark and record at each product section description of actual products installed, including the following:

1. Manufacturer's name and product model and number.
2. Product substitutions or alternates utilized.
3. Changes made by Addenda and modifications.

F. Project Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:

1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
3. Where proposed and existing utilities cross, the Contractor shall measure and record the horizontal location and vertical separation between each crossing. Separation shall be measured between exteriors and pipes.
4. Field changes of dimension and detail.
5. Details not on original Contract drawings.
6. Piling data locations, tip and cut–off elevations, and driving records.

G. Submit documents to Engineer with claim for final Application for Payment.

### 1.7 WARRANTIES AND BONDS

A. Provide duplicate notarized copies.

B. Execute and assemble transferable warranty documents from Subcontractors, suppliers, and manufacturers.

C. Provide Table of Contents and assemble in three D side ring binder with durable plastic cover.

D. Submit prior to final Application for Payment.

E. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of warranty period.

## PART 2 – PRODUCTS

Not Used

## PART 3 – EXECUTION

Not Used

END OF SECTION

**INDEX TO**

**SECTION 01 78 23**

**OPERATION AND MAINTENANCE DATA**

# SECTION 01 78 23

# OPERATION AND MAINTENANCE DATA

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Format and content of manuals.

B. Instruction of Owner's personnel.

C. Schedule of submittals.

### 1.2 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures.

B. Section 01 45 00 – Quality Control.

C. Section 01 77 00 – Closeout Procedures.

D. Section 01 78 33 – Bonds.

E. Section 01 78 36 – Warranties.

F. Individual Specifications Sections: Specific requirements for operation and maintenance data.

### 1.3 QUALITY ASSURANCE

A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.

### 1.4 FORMAT

A. Prepare data in the form of an instructional manual.

B. Binders: Commercial quality, 8–1/2 x 11 binders with durable plastic covers

C. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

D. Provide tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment.

E. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.

F. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

### 1.5 CONTENTS OF EACH VOLUME

A. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of Architect/Engineer, Subconsultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.

B. For Each Product or System: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

C. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

E. Bonds: Bind in original of each.

## PART 2 – PRODUCTS

Not Used

## PART 3 – EXECUTION

Not Used

END OF SECTION

**INDEX TO**

**SECTION 01 78 33**

**BONDS**

# SECTION 01 78 33

# BONDS

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Preparation and submittal of bonds.

B. Time and schedule of submittals.

### 1.2 RELATED SECTIONS

A. Document 00 11 16 – Invitation to Bid: Bid bonds.

B. Document General Conditions – EJCDC: Performance bond and labor and material payment bonds.

C. Section 01 77 00 –Closeout Procedures: Contract closeout procedures.

D. Section 01 78 23 – Operation and Maintenance Data.

E. Individual Specifications Sections: Bonds required for specific Products or Work.

### 1.3 FORM OF SUBMITTALS

A. Bind in commercial quality 8–1/2 x 11 binders with durable plastic covers.

B. Cover: Identify each binder with typed or printed title BONDS with title of Project; name, address and telephone number of Contractor; and name of responsible company principal.

C. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of Product or work item.

D. Separate each bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

### 1.4 PREPARATION OF SUBMITTALS

A. Obtain bonds executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of bond until the Date of Substantial completion is determined.

B. Verify documents are in proper form, contain full information, and are notarized.

C. Co–execute submittals when required.

D. Retain bonds until time specified for submittal.

**1.5 TIME OF SUBMITTALS**

A. Make other submittals within ten days after Date of Substantial Completion, prior to final Application for Payment.

B. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing the date of acceptance as the beginning of the bond period.

## PART 2 – PRODUCTS

Not Used

## PART 3 – EXECUTION

Not Used

END OF SECTION

**INDEX TO**

**SECTION 01 78 36**

**WARRANTIES**

# SECTION 01 78 36

# WARRANTIES

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Preparation and submittal of warranties.

B. Time and schedule of submittals.

### 1.2 RELATED SECTIONS

A. General Conditions – EJCDC: Warranties and correction of work.

B. Section 01 77 00 – Closeout Procedures: Contract closeout procedures.

C. Section 01 78 23 – Operation and Maintenance Data.

D. Individual Specifications Sections: Warranties required for specific Products or Work.

### 1.3 FORM OF SUBMITTALS

A. Bind in commercial quality 8–1/2 x 11 binders with durable cloth covers.

B. Cover: Identify each binder with typed or printed title WARRANTIES with title of Project; name, address and telephone number of Contractor and name of responsible company principal.

C. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of Product or work item.

D. Separate each warranty with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

### 1.4 PREPARATION OF SUBMITTALS

A. Obtain warranties executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial completion is determined.

B. Verify documents are in proper form, contain full information, and are notarized.

C. Co–execute submittals when required.

D. Retain warranties until time specified for submittal.

**1.5 TIME OF SUBMITTALS**

A. Make other submittals within ten days after Date of Substantial Completion, prior to final Application for Payment.

B. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing the date of acceptance as the beginning of the warranty period.

## PART 2 – PRODUCTS

Not Used

## PART 3 – EXECUTION

Not Used

END OF SECTION

**INDEX TO**

**SECTION 03 30 00 – CAST–IN–PLACE CONCRETE**

# SECTION 03 30 00

# CAST–IN–PLACE CONCRETE

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Slabs on grade.

B. Formwork, form accessories, and bracing.

C. Reinforcement.

### 1.2 RELATED SECTIONS

A. Section 31 00 00 – Earthwork

B. Section 31 10 00 – Site Clearing

C. Section 33 10 00 – Water Utilities

D. Section [33 30 00 – Sanitary Sewerage Utilities]

### 1.3 MEASUREMENT AND PAYMENT

A. Concrete – Slab–on–fill or Grade will be paid for by the lump sum price included with the pump station. Payment will include reinforcing, concrete, inserts, placement accessories, consolidating, finishing, curing, and removal of formwork.

B. All concrete work, other than slab–on–fill or grade, will be considered a part of the structure in which it is used and no direct measurement or payment will be made.

### 1.4 REFERENCES (LATEST REVISION)

A. ACI 211.1 – Selecting Proportions for Normal, Heavyweight, and Mass Concrete.

B. ACI 211.2 – Selecting Proportions for Structural Lightweight Concrete.

C. ACI 301 – Specifications for Structural Concrete.

D. ACI 302.1R – Guide for Concrete Floor and Slab Construction.

E. ACI 304R – Guide for Measuring, Mixing, Transporting and Placing Concrete.

F. ACI 305R – Hot Weather Concreting.

G. ACI 306R – Cold Weather Concreting.

H. ACI 308R – Guide to Curing Concrete.

I. ACI 318 – Building Code Requirements for Structural Concrete.

J. ACI 347 – Guide to Formwork for Concrete.

K. ASTM A185 – Steel Welded Wire Reinforcement, Plain, for Concrete.

L. ASTM A615 – Deformed and Plain Carbon – Steel Bars for Concrete Reinforcement.

M. ASTM A 775/A 775M – Epoxy Coated Steel Reinforcing Bars.

N. ASTM B 221 – Aluminum and Aluminum–Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

O. ASTM C 33 – Concrete Aggregates.

P. ASTM C 39 – Compressive Strength of Cylindrical Concrete Specimens.

Q. ASTM C 42 – Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.

R. ASTM C 94 – Ready–Mixed Concrete.

S. ASTM C 150 – Portland Cement.

T. ASTM C 172 – Practice for Sampling Freshly Mixed Concrete.

U. ASTM C 231 – Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

V. ASTM C 260 – Air–Entraining Admixtures for Concrete.

W. ASTM C 309 – Liquid Membrane–Forming Compounds for Curing Concrete.

X. ASTM C 330 – Light Weight Aggregates for Structural Concrete.

Y. ASTM C 494 – Chemical Admixtures for Concrete.

Z. ASTM C 618 – Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

AA. ASTM C 920 – Elastomeric Joint Sealants.

BB. ASTM C 1116 – Fiber – Reinforced Concrete.

CC. ASTM D 994 – Preformed Expansion Joint Filler for Concrete (Bituminous Type).

DD. ASTM D 1751 – Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non–extruding and Resilient Bituminous Types).

EE. ASTM D 2103 – Polyethylene Film and Sheeting.

FF. ASTM D 3740 – Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

GG. ASTM E 329 – Agencies Engaged in Construction Inspection, Testing, or Special Inspection.

**1.5 SUBMITTALS FOR REVIEW**

A. Section 01 33 00 – Procedures for Submittals.

B. Mix designs and test results as specified hereinafter.

C. Shop Drawings: Submit shop drawings for reinforcing steel and inserts to Engineer for review. Indicate sizes, spacing, and locations of reinforcing steel, supporting and spacing devices, bar bending details, and bar lists.

**1.6 SUBMITTALS FOR INFORMATION**

A. Section 01 33 00 – Procedures for Submittals.

B. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent work.

**1.7 SUBMITTALS AT PROJECT CLOSEOUT**

A. Section 01 77 00 –Closeout Procedures, 01 78 23 – Operation and Maintenance Data, 01 78 33 – Bonds, 01 78 36 – Warranties.

B. Accurately record actual locations of embedded utilities and components which are concealed from view.

**1.8 QUALITY ASSURANCE**

A. Perform Work in accordance with ACI 301.

B. Maintain at least one copy of ACI 301 document on site at all times.

C. Acquire cement and aggregate from same source for all work.

D. Conform to ACI 305R when concreting during hot weather.

E. Conform to ACI 306R when concreting during cold weather.

F. Conform to ACI 117 – Specifications for Tolerances for Concrete Construction and Materials.

G. Method of measurement for accessible route with a 24" digital smart–level will be used to measure points along the accessible route. Line of measurement shall be parallel to the long edge of ramp or accessible route, whether straight or curved. Longitudinal measurement lines shall be spaced 3 feet apart, but in no case shall fewer than two lines be used. The horizontal measurement [cross–slope] will be measured every 6 feet. Engineer reserves the right to gather additional

measurements if further investigation is necessary. The 24" Smart–level slope readings greater than specified tolerance within contract documents will be identified as non–compliant and not accepted.

H. Engineer reserves the right to mark and reject portions of concrete not within tolerance as specified.

I. Accessible Route Tolerance by measuring Floor Flatness and Levelness. Traffic floors [All Accessible Routes] shall conform to the following surface profile tolerances:

a. Floor Designation: All floor areas not specified to be part of the "defined traffic floor" [Accessible Routes] shall be part of a "random traffic floor"[Non–accessible Route]. Any floor slab comprising part of the traffic floor shall be designated a "traffic slab" [Accessible Route].

b. Flatness and Levelness Tolerances: A traffic floor shall conform to the following surface profile tolerances:

Floor Flatness Number: $F_F$
Specified Overall Value = [38]
Minimum Local Value = [25]
Floor Levelness Number: $F_L$
Specified Overall Value = [25]
Minimum Local Value = [17]

c. Floor Tolerance Measurements: $F_F$ and $F_L$ tolerances shall be tested in accordance with ASTM E 1155. Actual overall F–numbers shall be calculated using the inferior/superior area method.

d. Timeliness of Floor Profile Tests & Reports: All floor tolerance measurements shall be made within 48 hours after slab installation. In all cases, tolerance measurements shall precede the removal of shores and forms. Results of all floor profile tests (including a running tabulation of overall $F_F$ and $F_L$ values for all of traffic slabs installed to date) shall be provided to the Contractor within 72 hours after each slab installation.

e. Remedy for Out–of–Tolerance Work: For purposes of flatness and levelness control, minimum floor section boundaries shall coincide with the control joints. Profile test compliance requirements apply to the time period specified above only. Contractor shall remedy any floor section measuring below either the minimum local $F_F$ or $F_L$ number. Any floor section measuring at or above both the minimum local $F_F$ and $F_L$ number shall be accepted. If actual overall $F_F$ or $F_L$ number for entire random–traffic floor installation measures less than its specified value, then Contractor shall undertake remedial measures acceptable to the Engineer.

J. Defined random traffic floors [Non–accessible Routes] shall conform to the following surface profile tolerances:

a. Floor Designation: All floor areas specified as "defined random traffic floor" include only the [Non–accessible route].

b. Flatness and Levelness Tolerances: The defined traffic floor shall conform to the following surface profile tolerances: $F_{min}$ = [25]

c. Floor Tolerance Measurements: $F_{min}$ tolerances shall be tested in accordance with ASTM E 1486.

d. Timeliness of Floor Profile Tests & Reports: All floor tolerance measurements shall be made by the Contractor within [24] hours after slab installation and before saw cutting of control joints. In all cases, tolerance measurements shall precede the removal of shores and forms. Results of all floor profile tests including a running tabulation of overall $F_{min}$ values for all of defined–traffic slabs installed to date shall be provided to the Contractor within [48] hours after each slab installation.

K. Remedy for Out–of–Tolerance Work: For purposes of flatness and levelness control, minimum floor section boundaries shall coincide with the construction joints. Profile test compliance requirements apply to time period specified above only. Contractor shall remedy any floor section measuring below the $F_{min}$ number, in accordance with recommendations of the Engineer. Any floor section measuring at or above the $F_{min}$ number shall be accepted. If actual overall $F_{min}$ number entire defined–traffic floor installation measures less than its specified value, then Contractor shall undertake remedial measures acceptable to the Engineer.

If a portion of a floor does not meet specified F–number, the following remedies are recommended:

a. Local value is out of spec – grind or replace floor.

b. Overall value is out of spec – Contractor shall pay the Owner per square foot for portion of floor not meeting F–number spec. This can be obtained by specifying a figure in project specifications in conjunction with square footage obtained from reading taken in the field.

## 1.9 TESTS

A. All sampling and testing services shall be performed by a testing agency which operates in accordance to ASTM D 3740 and E 329 latest revision and acceptable to the Engineer, at Contractor's expense.

B. Contractor shall submit to the Engineer, concrete materials and concrete mix designs on each class of concrete proposed for use. This submittal shall include results of all testing performed to qualify materials and establish mix designs. All mix designs shall be proportioned in accordance with Section 3.9 of ACI 301, Method 1 (trial batches) or Method 2 (field experience). The average strength used as basis for selecting proportions shall be as specified in Paragraph 3.9.2 of ACI 301.

C. Testing laboratory shall conduct strength tests of the concrete during construction in accordance with Section 16.3.4 of ACI 301. At least one strength test (4 test cylinders) shall be made for each 50 cubic yards or fraction thereof, of each mix design placed each day.

D. Slump tests shall be conducted regularly during construction in accordance with Section 16.3.5 of ACI 301.

E. Air content of the concrete sample for each strength test shall be determined in accordance with Section 16.3.6 of ACI 301.

F. Results of all tests shall be submitted to Engineer, with copies to Contractor. Test reports shall include exact location in the work at which batch represented by a test was deposited.

G. Evaluation of test results and acceptance of concrete shall be in accordance with Chapter 17 of ACI 301.

### 1.10 ACCEPTANCE OF COMPLETED WORK:

A. Acceptance or rejection of completed concrete work shall be in accordance with Chapter 18 of ACI 301.

## PART 2 – PRODUCTS

### 2.1 FORM MATERIALS

A. Shall conform to ACI 301.

B. Shall be wood, plywood, metal or other accepted material and of grade or type suitable to obtain the finish specified.

C. Form Ties: Removable or snap–off type, galvanized metal, adjustable length, and free of defects which could leave holes larger than 1–inch in concrete surface.

D. Form Release Agent: Colorless mineral oil which will not stain concrete, or absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.

### 2.2 REINFORCING STEEL

A. Reinforcing Steel: ASTM A 615, Grade 60 billet steel deformed bars; uncoated finish.

B. Welded Steel Wire Fabric: Plain type, ASTM A 185; uncoated finish.

C. When specifically called for on the plans, reinforcing bars shall be epoxy–coated in accordance with ASTM A775.

## 2.3 CONCRETE MATERIALS

A. Cement: ASTM C150, Type IA – Air Entraining.

B. Fine and Coarse Aggregates: ASTM C33. Coarse aggregate shall consist of granite stone.

## 2.4 ADMIXTURES

A. Air Entrainment: ASTM C260.

B. Pozzolanic Admixtures: ASTM C618.

C. Calcium chloride or admixtures containing more than 0.1% chloride ions are not permitted.

D. Certification: Written certification of conformance to above–mentioned requirements and the chloride ion content will be required from admixture manufacturer prior to mix design review by Engineer.

## 2.5 ACCESSORIES

A. Bonding Compound: Polyvinyl acetate, rewettable type; by the Sika Corporation or equivalent.

B. Epoxy Adhesive: Two component, 100% solids, 100% reactive compound suitable for use on dry or damp surfaces; Sikadur by Sika Corporation or equivalent.

C. Vapor Retarder: ASTM–D 2103, 6 mil thick clear polyethylene film, type recommended for below grade application.

D. Non–Shrink Grout: Premixed compound consisting of non–metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days; Sika Grout 212 manufactured by Sika Corporation or equivalent.

E. Waterstop: Active betonite/butyl rubber–based material equivalent to Waterstop–RX manufactured by Volclay.

## 2.6 JOINT FILLER MATERIALS

A. Joint Filler: ASTM D1751; Asphalt impregnated fiberboard or felt, tongue and groove profile.

B. Sealant: Joints shall be sealed per detail on project drawings, conforming to ASTM C 920, Type S or M, Grade P or NS, Class 25.

## 2.7 CURING MATERIALS

A. Membrane Curing Compound: ASTM C 309, clear with fugitive dye.

### 2.8 CONCRETE MIX

A. Concrete shall be batched, mixed and transported from a supplier with sufficient facilities to deliver concrete at the rate required and in accordance with ASTM C 94. Ready–mix concrete supplier shall furnish Engineer a certified statement the concrete furnished conforms to provisions of these specifications.

B. Compressive Strength: Minimum 3,500 psi in 28 days.

C. Slump: 4 to 5 inches.

D. Use accelerating admixtures in cold weather only when acceptable to Engineer. Use of admixtures will not relax cold weather placement requirements.

E. Use calcium chloride only when accepted by Engineer.

F. Use set retarding admixtures during hot weather only when accepted by Engineer.

G. Add air entraining agent to normal weight concrete mix for work exposed to exterior.

## PART 3 – EXECUTION

### 3.1 ON SITE OBSERVATIONS OF WORK

A. Engineer or Project Representative will have the right to require any portion of work be completed in their presence and if work is covered up after such instruction, it shall be exposed by Contractor for observation. However, if Contractor notifies the Engineer such work is scheduled, and Engineer fails to appear within 48 hours, Contractor may proceed.

B. All work completed and materials furnished shall be subject to review by the Engineer or Project Representative. Improper work shall be reconstructed. All materials, which do not conform to requirements of specifications, shall be removed from work upon notice being received from the Engineer for rejection of such materials. Engineer shall have the right to mark rejected materials to distinguish them as such.

C. Contractor shall give the Project Engineer or Project Representative a minimum of 48 hours notice for all required observations or tests.

### 3.2 EXAMINATION

A. Verify site conditions for conformance with requirements.

B. Verify requirements for concrete cover over reinforcement.

C. Verify anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.

## 3.3 FORMWORK ERECTION

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. Forms shall conform to shapes, lines and dimensions of members as called for on the plans and shall be sufficiently tight to prevent leakage of mortar.

D. Earth cuts shall not be used as forms for vertical surfaces.

E. Contractor shall coordinate the work of other sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts.

F. Before placing of either reinforcing steel, embedded items, or concrete, surfaces of forms shall be covered with an accepted coating material which will effectively prevent absorption of moisture, prevent bond with the concrete and will not stain concrete surfaces.

## 3.4 FORM REMOVAL

A. Forms shall be removed carefully to avoid damage to green concrete. Ties shall be cut back 1inch from the surface and all holes, stone pockets, voids, and minor defects shall be patched immediately upon removal of forms. Subject to acceptance by Engineer, forms shall be removed according to the following table:

| | **Temperature (° F)** | | | | |
|---|---|---|---|---|---|
| | **Over 95°** | **70–95°** | **60–70°** | **50–60°** | **Below 50°** |
| | | | | | |
| Walls | 5 Days | 1.5 Days | 2 Days | 3 Days | When Test |
| Columns | 7 Days | 2 Days | 3 Days | 4 Days | Cylinder Develops |
| Beams | 10 Days | 4 Days | 5 Days | 6 Days | 50% of 28 Day |
| Slabs | 10 Days | 5 Days | 6 Days | 7 Days | Strength |

Contractor shall keep live loads off the concrete until it has sufficient strength to support applied loads.

B. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.

C. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.

D. Store removed forms so surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

## 3.5 REINFORCEMENT

A. All reinforcement shall be free of mud, oil or other materials which may adversely affect or reduce the bond.

B. Reinforcement shall be placed, supported, and secured against displacement by construction loads or the placing of concrete. Bar supports and spacers shall be made of concrete, metal, plastic, or other accepted material and subject to review by the Engineer. Where concrete surface will be exposed to weather in the finished structure, portions of all accessories within 1/2 inch of surface shall be noncorrosive or protected against corrosion.

C. Reinforcement shall be placed in accordance with ACI 301, Chapter 5.6 and 5.7. Minimum concrete cover for reinforcement shall be as required in paragraph 5.7.1 of ACI 301.

D. Field bending of bars partially imbedded in concrete will not be permitted unless specifically accepted by the Engineer.

E. Locate reinforcing splices not indicated on the drawings at points of minimum stress.

## 3.6 PREPARATION FOR PLACING

A. Water shall be removed from excavations before concrete is deposited. Hardened concrete debris and other foreign materials shall be removed from the interior of forms and inside of mixing and conveying equipment.

B. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.

C. 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.

D. Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.

E. Templates shall be used for the proper installation of anchor bolts. Templates and anchor bolts shall be in position prior to placing the concrete.

## 3.7 PLACING CONCRETE

A. Place concrete in accordance with ACI 304.

B. Concrete shall be placed only upon surfaces free from frost, ice, mud, standing water and other detrimental substances or conditions. When concrete is to be placed on dry soil or other pervious material, polyethylene sheeting shall be laid over surfaces to receive the concrete.

C. Notify Engineer minimum 48 hours prior to commencement of operations.

D. Concrete shall be handled and deposited using equipment and methods which will prevent segregation or loss of ingredients. Equipment and methods for placing concrete shall be subject to review by the Engineer.

E. Concrete having attained its initial set or having contained water for more than 45 minutes shall not be used in the work.

F. Sufficient mixing and placing capacity shall be provided so concrete which is being integrated with fresh concrete is still plastic. Concrete shall be deposited continuously or in layers of such thickness so no concrete will be deposited on concrete which has hardened sufficiently to cause formation of seams or planes of weakness within the section. If a section cannot be placed continuously, construction joints shall be placed subject to acceptance by the Engineer.

G. Concrete shall not be allowed or caused to flow horizontally or on slopes in the forms. Concrete placing on a slope shall begin at lower end of the slope and progress upward.

H. Consolidate by mechanical vibration so concrete is thoroughly worked around the reinforcement, around embedded items and into corners of forms and around piling. Use of vibrators to transport concrete within forms shall not be allowed. A spare vibrator shall be kept on the job site during all concrete placing operations.

I. When temperature of the surrounding air is expected to be below 40 degrees F during placing or 24 hours thereafter, temperature of concrete as placed, shall be no lower than 55 degrees for sections less than 12 inches in any dimension nor 50 degrees for any other sections. The temperature of the concrete as placed shall not be so high as to cause difficulty from loss of slump, flash set or cold joints and shall not exceed 95 degrees F.

J. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints, are not disturbed during concrete placement.

K. Install vapor retarder under interior slabs on grade. Lap joints minimum 6 inches and seal watertight by [sealant applied between overlapping edges and ends.

L. Repair vapor retarder damaged during placement of concrete reinforcing. Repair with vapor retarder material; lap over damaged areas minimum 6 inches and seal watertight.

M. Separate slabs on grade from vertical surfaces with joint filler.

N. Place joint filler in floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.

O. Extend joint filler from bottom of slab to within 1/8 inch of finished surface.

P. Install construction joint devices in coordination with floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.

Q. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

R. Place concrete continuously between predetermined expansion, control, and construction joints.

S. Do not interrupt successive placement or permit cold joints to occur.

T. Place floor slabs in [checkerboard] [or] [saw cut] pattern indicated.

U. Saw cut joints within 24 hours after placing. Use 3/16 inch thick blade, cut into 1/4 depth of slab thickness.

V. Screed slabs on grade level, maintaining surface flatness of maximum 1/4 inch in 10 ft.

## 3.8 CONCRETE FINISHING

A. Formed surfaces of concrete shall be given finishes specified below unless the contract documents specify otherwise.

1. Rough Form Finish – For all concrete surfaces not exposed to public view. No selected form facing materials shall be specified for rough form finish surfaces. Tie holes and defects shall be patched. Fins exceeding 1/4 inch in height shall be chipped or rubbed off. Otherwise, surfaces shall be left with texture imparted by the forms.

2. Smooth Form Finish – For all concrete surfaces exposed to public view. Form facing material shall produce a smooth, hard, uniform texture on the concrete. Arrangement of facing material shall be orderly and symmetrical, with the number of seams kept to a practical minimum. It shall be supported by studs or other backing capable of preventing excessive deflection. Materials with raised grain, torn surfaces, worn edges, patches, dents, or other defects which will impair the texture of concrete surface shall not be used. All fins shall be completely removed. No later than the day following form removal, concrete surfaces shall be wetted and rubbed with carborundum brick or other abrasive until uniform color and texture are produced.

3. Tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces shall be struck smooth after concrete is placed and shall be floated to a texture reasonably consistent with the formed surfaces. Final treatment on formed surfaces shall continue uniformly across the unformed surfaces.

B. Slab Finishes – Unless otherwise specified on contract documents, the following finishes shall be used as applicable:

1. Floated Finish – For surfaces intended to receive roofing or waterproofing membranes. After the concrete has been placed, consolidated, struck off, and leveled, it shall not be worked further until ready for floating. Floating with a hand float or with a bladed power trowel equipped with

float shoes, or with a powered disc float shall begin when water sheen has disappeared and when surface has stiffened sufficiently to permit the operation. All high spots shall be cut down and all low spots filled during this procedure. The slab shall then be refloated immediately to a uniform sandy texture.

2. Broom or Belt Finish – For sidewalks, pump station floor slabs, and ramps. Immediately after concrete has received a float finish as specified above, it shall be given a coarse transverse scored texture by drawing a broom or burlap belt across the surface.

3. Troweled Finish – For floor intended as walking surfaces. The surface shall first be float–finished as specified above. It shall next be power troweled, and finally hand troweled. The first troweling after power floating shall produce a smooth surface which is relatively free of defects but which may still show some trowel marks. Additional trowelings shall be completed by hand after the surface has hardened sufficiently. Final troweling shall be completed when a ringing sound is produced as trowel is moved over the surface. The surface shall be thoroughly consolidated by hand troweling operations. The finished surface shall be essentially free of trowel marks, uniform in texture and appearance and shall be within required tolerances.

4. Nonslip Finish – For exterior platforms, steps, and landings; and for exterior and interior pedestrian ramps. Crushed ceramically bonded aluminum oxide or other specified selected abrasive particles shall be blended with portland cement in proportions recommended by manufacturer of the aggregate. The surface shall be given a float finish in accordance with paragraph 1 above. Approximately two–thirds of blended material for required coverage shall be applied to the surface, insuring even coverage without segregation. Floating shall begin immediately after application of the first "dry shake." After this material has been embedded by floating, the remainder of blended material shall be applied to surface at right angles to previous application. A second floating shall follow immediately. The rate of application of such material shall be not less than 25 lb. per 100 square feet.

C. Slab Finish Tolerances – Unless otherwise called out in the contract documents, finishes shall be true planes within 1/4 inch in 10 feet as determined by a 10 ft. straightedge placed anywhere on the slab in any direction. Maximum variation in elevation for a level slab shall not exceed 1/2 inch over the entire slab.

## 3.9 CONCRETE CURING

A. Immediately after placement and finishing, concrete shall be protected from moisture loss for not less than 7 days. For surfaces not in contact with forms, curing compound shall be uniformly applied after water sheen disappears from the concrete. Formed surfaces shall receive an application of curing compound if forms are removed during the 7 day curing period. Curing compound shall not be applied during rainfall.

B. Curing compound shall be applied under pressure at the rate of 1 gallon per 150 square feet by mechanical sprayers. The spraying equipment shall be of the fully atomizing type. At time of use, curing compound shall be thoroughly mixed with a fugitive dye uniformly dispersed throughout the sprayer. Care shall be taken to prevent application to joints where concrete bond is required, to reinforcement steel and to joints where joint sealer is to be placed. The compound shall form a uniform continuous coherent film which will not crack or peel and shall be free from pinholes and other imperfections. Concrete surfaces subjected to heavy rainfall within 3 hours after curing compound has been applied shall be resprayed by the above method and at above coverage at no additional expense to Owner.

C. No pedestrian or vehicular traffic shall be allowed over the surface for seven days unless surface is protected by planks, plywood, or sand. The protection shall not be placed until at least 12 hours after application of curing compound.

D. Protect concrete by suitable methods to prevent damage by mechanical injury or excessively hot or cold temperatures.

## 3.10 FIELD QUALITY CONTROL

A. Field sampling and testing shall be performed by an independent testing lab. Samples of concrete shall be taken at random locations from work and at such times to represent quality of materials and work throughout the project. The laboratory shall provide necessary labor, materials, equipment, and facilities for sampling concrete and for casting, handling and storing concrete samples at site of work. Sampling of concrete will be in accordance with ASTM C172. Samples for pumped concrete shall be taken at the hose discharge point. Samples for other concrete shall be taken at the hopper of concreting equipment or transit mix truck.

B. Contractor shall pay for the following services when required:

1. All testing, test results, or certifications required to verify a proposed material item or mix design meets requirements of the specifications.

2. Additional testing and inspection required because of changes in materials or proportions requested by the Contractor.

3. Additional testing of materials or concrete occasioned by their failure by test or observation to meet specification requirements. For example, if compressive test results indicate concrete in place may not meet structural requirements, tests shall be made to determine if the structure or portion thereof is structurally sound. Tests may include, but not be limited to, cores in accordance with ASTM C 42 and any other load tests acceptable to the Engineer. Costs of such tests will be borne by the Contractor.

C. To facilitate testing and observation, Contractor shall advise Owner and designated testing agency sufficiently in advance of operations to allow for the assignment of personnel and for completion of quality tests and checking of forms.

D. Strength Tests –

1. General – Strength of the concrete will be verified by testing laboratory during placement of concrete. Verification shall be accomplished by testing standard cylinders of concrete samples taken at the job site.

2. Frequency – As a minimum, one set of four standard cylinders shall be cast of each class of concrete based on the most stringent of the following requirements as applicable:

   - for each 50 cubic yards or less
   - for each 4,000 square feet of surface area
   - for each day a pour is made

3. Lab Testing – Testing of specimens for compressive strength shall be made in accordance with ASTM C39. Tests shall be made at 7 and 28 days from time of casting. One test cylinder from each group of four shall be tested at the end of 7 days and three shall be tested at the end of 28 days. Each strength test result shall be the average of the strengths of three test cylinders (cast from material taken from a single load of concrete) at 28 days.

4. Acceptance of Concrete Strength – Strength level of concrete will be considered satisfactory so long as the average of all sets of three consecutive strength results equal or exceed specified compressive strength and not more than 10% of strength test results shall have values less than specified value. No individual strength test shall be less than the specified compressive strength by more than 500 psi.

E. Slump Tests – The slump shall be as specified when measured in accordance with ASTM C 143. Samples for slump determination shall be taken from the concrete during placing. Tests shall be made at the beginning of concrete placing operations and at subsequent intervals to insure specification requirements are met. When concrete is pumped, slump tests shall be taken from the discharge end of pump hose. Slump tests shall also be performed whenever standard cylinders are cast.

F. Temperature and Air Content Tests: Temperature tests shall be made at frequent intervals during hot or cold weather conditions until satisfactory temperature control is established. Whenever standard cylinders are cast, temperature tests shall be performed. Air content tests shall be in accordance with ASTM C 231 and measured whenever standard cylinders are cast.

END OF SECTION

**INDEX TO**

**SECTION 31 00 00 – EARTHWORK**

# SECTION 31 00 00

# EARTHWORK

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Grading

B. Excavation

C. Backfilling

D. Compaction

E. Remove and Replace Topsoil

F. Dressing of Shoulders and Banks

G. Stone Drainage Filter

H. Water Control

I. Testing

### 1.2 RELATED SECTIONS

A. Section 01 45 00 – Quality Control

B. Section 01 45 23 – Testing and Inspecting Services

C. Section 31 10 00 – Site Clearing

### 1.3 MEASUREMENT AND PAYMENT

A. Grading to subgrades, construction of ditches, dressing of disturbed areas, removing and replacing topsoil, excavating, backfilling and compacting to required elevations, testing, staking, and construction supervision shall be included in the bid proposal prices incidental to the installation of water and sewer mains.

B. Unsuitable Material – Payment will be made on a contract unit price for each cubic yard removed. Payment will include excavation and disposal of unsuitable material.

C. Borrow – Payment will be made on a contract unit price for each cubic yard in place. Payment will include furnishing materials required in excess of suitable materials available on site.

D. Earthwork – All earthwork associated with the installation of bulkheads, headwalls, wingwalls, weir structures, drainage filters, rip–rap, etc. shall not be measured for direct payment. Payment for the earthwork shall be included in the item to which it pertains.

E. Dewatering – No direct payment shall be made for dewatering. Dewatering shall be included in the item to which it pertains.

F. Proof Rolling – Payment will be made at the contract unit price. Payment will include furnishing a loaded truck, truck driver, fuel and rolling the designated areas.

## 1.4 REFERENCES (LATEST REVISION)

A. ASTM D 448 – Sizes of Aggregate for Road and Bridge Construction.

B. ASTM D 1557 – Laboratory Compaction Characteristics of Soil Using Modified Effort.

C. ASTM D 2487 – Classification of Soils for Engineering Purposes (Unified Soil Classification System).

D. ASTM D 3740 – Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

E. ASTM D 6938 – In–Place Density and Water Content of Soil and Soil–Aggregate by Nuclear Methods (Shallow Depth).

F. ASTM E 329 – Agencies Engaged in Construction Inspection, Testing, or Special Inspection.

## 1.5 SUBMITTALS

A. Section 01 33 00 – Submittal Procedures: Procedures for submittals.

B. Materials Source: Submit gradation analysis, proctor results, and soil classification for all borrow material.

## 1.6 QUALITY ASSURANCE

A. Perform work in accordance with, State of South Carolina, County of Colleton, standards.

## 1.7 TESTING

A. Laboratory tests for moisture density relationship for fill materials shall be in accordance with ASTM D 1557, (Modified Proctor).

B. In place density tests in accordance with ASTM D 6938.

C. Testing laboratory shall operate in accordance with ASTM D 3740 and E 329 and be acceptable to the Engineer.

D. The testing laboratory and Project Engineer/Project Representative shall be given a minimum of 48 hours notice prior to taking any of the tests.

E. Testing shall be Contractor's responsibility and performed at Contractor's expense by a commercial testing laboratory operating in accordance with subparagraph C above.

F. Test results shall be furnished to the Engineer prior to continuing with associated or subsequent work.

## PART 2 – PRODUCTS

### 2.1 MATERIALS

A. Borrow shall consist of sand or sand–clay soils capable of being readily shaped and compacted to the required densities, and shall be reasonably free of roots, trash, rock larger than 2 inches, and other deleterious material.

B. All soils used for structural fills shall have a PI (plastic index) of less than 10, and a LL (liquid limit) of less than 30. Fill soils shall be dried or wetted to appropriate moisture contents prior to compaction. Additionally, fill soils used for the top 2 feet of fill beneath roads and parking lots shall have no more than 15% passing the # 200 sieve. Fill soils used for house lots shall have no more than 25% passing the # 200 sieve.

C. Contractor shall furnish all borrow material.

D. Contractor shall be responsible for and bear all expenses in developing borrow sources including securing necessary permits, drying the material, haul roads, clearing, grubbing, excavating the pits, placing, compaction and restoration of pits and haul roads to a condition satisfactory to property owners and in compliance with applicable federal, state, and local laws and regulations.

### 2.2 SOURCE QUALITY CONTROL

A. If tests indicate materials do not meet specified requirements, change material and retest.

B. Provide materials of each type from same source throughout the Work.

## PART 3 – EXECUTION

### 3.1 TOPSOIL

A. Contractor shall strip topsoil and stockpile on site at a location determined by the Owner at the Contractor's expense.

B. Topsoil shall be placed to a depth of 4 inches over all disturbed or proposed landscaped areas.

C. Topsoil shall be provided at Contractor's expense if it is not available from site.

D. Any remaining topsoil will be hauled off site at the Contractors expense.

E. Do not excavate wet topsoil.

## 3.2 EXCAVATION

A. Excavation is unclassified and includes excavation to subgrade elevations indicated, regardless of character of materials or obstructions encountered.

B. Suitable excavation material shall be transported to and placed in fill areas within limits of the work.

C. Unsuitable material encountered in areas to be paved and under building pads, shall be excavated 2 feet below final grade and replaced with suitable material from site or borrow excavations. Contractor shall notify Engineer if more than 2 feet of excavation is needed to replace unsuitable material.

D. Unsuitable and surplus excavation material not required for fill shall be disposed of off site.

E. Proper drainage, including sediment and erosion control, shall be maintained at all times. Methods shall be in accordance with the National Pollutant Discharge Elimination System standards and other local, state, and federal regulations.

F. Unsuitable materials as stated herein are defined as highly plastic clay soils, of the CH and MH designation, border line soils of the SC–CH description, and organic soils of the OL and OH description based on the Unified Soils Classification System. Further, any soils for the top two feet of pavement subbase shall have no more than 15% passing the # 200 sieve.

## 3.3 GROUND SURFACE PREPARATION FOR FILL

A. All vegetation, roots, brush, heavy sods, heavy growth of grass, decayed vegetable matter, rubbish, and other unsuitable material within the areas to be filled shall be stripped and removed prior to beginning the fill operation.

B. Sloped ground surfaces steeper than 1 vertical to 4 horizontal, on which fill is to be placed shall be plowed, stepped, or benched, or broken up as directed, in such a manner where fill material will bond with the existing surface.

C. Surfaces on which fill is to be placed and compacted shall be wetted or dried as may be required to obtain the specified compaction.

## 3.4 FILL

A. Shall be placed in successive horizontal layers 8 inches to 12 inches in loose depth for the full width of the cross–section and compacted as required.

## 3.5 FINISHED GRADING

A. All areas covered by the project including excavated and filled sections and adjacent transition areas shall be smooth graded and free from irregular surface changes.

B. Degree of finish shall be that ordinarily obtainable from either blade–grader or scraper operations, supplemented with hand raking and finishing, except as otherwise specified.

C. Unpaved areas to within 0.1 feet of elevations shown on the drawings provided such deviation does not create low spots that do not drain.

D. Paved Areas – Subgrade to within 0.05 feet of the drawing elevations less the compacted thickness of the base and paving.

E. Ditches shall be finished graded, dressed, and seeded within 14 calendar days of work to reduce erosion and permit adequate drainage.

## 3.6 DISPOSAL OF WASTE MATERIAL

A. All vegetation, roots, brush, sod, broken pavements, curb and gutter, rubbish, and other unsuitable or surplus material stripped or removed from limits of construction shall be disposed of by the Contractor.

## 3.7 PROTECTION

A. Graded areas shall be protected from traffic, erosion, settlement, or any washing away occurring from any cause prior to acceptance.

B. Contractor shall be responsible for protection of below grade utilities shown on the drawings or indicated by the Owner at all times during earthwork operations.

C. Repair or re–establishment of graded areas prior to final acceptance shall be at the Contractors expense.

D. Site drainage shall be provided and maintained by Contractor during construction until final acceptance of the project. Drainage may be by supplemental ditching, or pumping if necessary, prior to completion of permanent site drainage.

## 3.8 DRAINAGE

A. Contractor shall be responsible for providing surface drainage away from all construction areas. This shall include maintenance of any existing ditches or those constructed in the immediate vicinity of the work. Contractor shall provide proper and effective measures to prevent siltation of wetlands, streams, and ditches on both the Owner's property, and those properties downstream.

## 3.9 FIELD QUALITY CONTROL

A. Compaction testing shall be performed in accordance with ASTM D 6938. Where tests indicate the backfill does not meet specified requirements, the backfill shall be reworked or removed and replaced, and then retested at the Contractor's expense.

B. Unpaved areas – at least 90% of maximum laboratory density within 2% optimum moisture content unless otherwise approved by the Engineer.

C. Paved Areas and Under Structures – top 6 inch layer of subbase to at least 98% of maximum laboratory density within 2% optimum moisture content. Layers below top 6 inches shall be compacted to 95% of maximum laboratory density within 2% optimum moisture content.

D. Rolling and compaction equipment and methods shall be subject to acceptance by the Engineer. Acceptance in no way relieves Contractor of the responsibility to perform in correct and timely means.

Number of Tests – Under paved areas, no less than one density test per horizontal layer per 5,000 square feet of subbase shall be made. In unpaved areas, no less than one density test per horizontal layer per 10,000 square feet of fill area shall be made. Under curb and gutter, no less than one density test per every 300 linear feet.

## 3.10 PROOF ROLLING

A. Shall be required on the subbase of all curb and gutter and paved areas and on the base of all paved areas where designated by the Engineer. Proof rolling shall take place after all underground utilities are installed and backfilled. The operation shall consist of rolling the subbase or base with a fully loaded 10–wheeled dump truck. A full load shall consist of 10 to 12 cubic yards of soil or rock. The dump truck shall be capable of traveling at a speed of two to five miles per hour and be in sound mechanical shape with no exhaust leaks or smoking from burning oil. The Engineer shall determine number of passes and areas rolled.

END OF SECTION

**INDEX TO**

**SECTION 31 10 00 – SITE CLEARING**

# SECTION 31 10 00

# SITE CLEARING

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Removal of surface debris.

B. Removal of trees, shrubs, and other plant life.

C. Topsoil excavation.

### 1.2 RELATED SECTIONS

A. Section 31 00 00 – Earthwork.

### 1.3 MEASUREMENT AND PAYMENT

A. Site Clearing: Clearing, grubbing and other items to be removed will be included in the per acre price in the proposal for clearing work. Includes clearing site, removing stumps, loading and removing waste materials from site.

### 1.4 REGULATORY REQUIREMENTS

A. Coordinate clearing Work with utility companies.

## PART 2 – PRODUCTS

### 2.1 MATERIALS

A. Provide tree protection materials as detailed on the construction drawings.

## PART 3 – EXECUTION

### 3.1 PREPARATION

A. Verify existing plant life designated to remain is tagged or identified.

### 3.2 PROTECTION

A. All trees on site will be saved except those marked specifically by the Owner's representative for removal during construction. No trees, including those marked for removal on site or any other tree, may be removed prior to the

preconstruction conference. All trees not to be removed will be protected from injury to their roots and to their top to a distance three feet beyond the drip–line and no grading, trenching, pruning, or storage of materials may go in this area except as provided by an Owner's representative stakeout. Contractor will pay a penalty for any tree removed from the site that has not been marked specifically for removal. Contractor also will pay for any tree that dies due to damage during construction. This applies to all trees on site whether or not they are shown on the plans.

B. Contractor shall not be held accountable for damages to trees resulting from placement of fill or removal of soils where such action is required by the contract documents. Any tree, the trunk of which is within 10 feet of any footing or trench, shall be exempt from these penalties except Contractor shall exercise all reasonable precautions to preserve even these trees. Contractor agrees to pay fines as established below in the event he or any of his subcontractors causes loss or removal of trees designated to be saved under provisions of this contract.

The fines are as follows:

| Caliper | Fine |
|---|---|
| 1" – 2" | $ 150.00 |
| 2" – 3" | 200.00 |
| 3" – 4" | 250.00 |
| 4" – 5" | 400.00 |
| 5" – 6" | 500.00 |
| 6" – 7" | 600.00 |
| 7" – 8" | 750.00 |
| 8" – 11" | 1,500.00 |
| 12" – 20" | 2,000.00 |
| 21" & larger | $ 2,500.00 |

C. Trees shall be graded by Owner's representative as to variety, condition, and site importance, with above figures acting as a maximum fine. Lowest assessment amount shall be no less than one–half of the above fine figures.

D. Protect benchmarks, survey control points, and existing structures from damage or displacement.

E. Protect all remaining utilities.

F. Clearing operations shall be conducted to prevent damage by falling trees to trees left standing, to existing structures and installations, and to those under construction, and to provide for the safety of employees and others.

**3.3 CLEARING**

A. Clear areas required for access to site and execution of work. Clearing shall consist of felling and cutting trees into sections, and satisfactory disposal of trees and other vegetation designated for removal, including downed timber, snags, brush, and rubbish occurring within area to be cleared. Trees, stumps, roots, brush, and other vegetation in areas to be cleared shall be removed completely

from the site, except such trees and vegetation as may be indicated or directed to be left standing. Trees designated to be left standing within cleared areas shall be trimmed of dead branches 1–1/2 inch or more in diameter. Limbs and branches to be trimmed shall be neatly cut close to the trunk of the tree or main branches. Cuts more than 1–1/2 inches in diameter shall be painted with an accepted treewound paint. Trees and vegetation to be left standing shall be protected from damage incident to clearing, grubbing, and construction operations, by the erection of timber barriers or by such other means as circumstances require. Such barriers must be placed and be checked by the OWNER before construction observations can proceed (See 3.2). Clearing shall also include removal and disposal of structures obtruding, encroaching upon, or otherwise obstructing the work.

**3.4 REMOVAL**

A. Where indicated or directed, trees and stumps shall be removed from areas outside those areas designated for clearing and grubbing. Work shall include felling of such trees and removal of their stumps and roots. Trees shall be disposed of as hereinafter specified.

B. Remove debris, rock, and other extracted plant life from site.

**3.5 DISPOSAL**

A. Disposal of trees, branches, snags, brush, stumps, etc., resulting from clearing and grubbing shall be the Contractor's responsibility and shall be disposed of by burning, removal from site, or a combination of both. All costs in connection with disposing of materials will be at the Contractor's expense. Material disposed of by burning shall be burned in a manner avoiding all hazards, such as damage to existing structures, construction in progress, trees, and vegetation. Contractor shall be responsible for compliance with all local and State laws and regulations relative to the building of fires. Disposal by burning shall be kept under constant attendance until fires have burned out or extinguished. All liability of any nature resulting from disposal of cleared and grubbed material shall become the Contractor's responsibility. Disposal of all materials cleared and grubbed will be in accordance with rules and regulations of the State of South Carolina. No material will be burned unless directed to do so by the OWNER. Contractor shall obtain a permit to burn on site from local fire department, before beginning the work.

**3.6 GRUBBING**

A. Grubbing shall consist of removal and disposal of stumps, roots larger than one inch in diameter, and matted roots from designated grubbing areas. This material, together with logs and other organic or metallic debris not suitable for building of pavement subgrade or building pads, shall be excavated and removed to a depth of not less than 18 inches below original surface level of the ground in embankment areas and not less than 2 feet below finished earth surface in excavated areas. Depressions made by grubbing shall be filled with suitable material and compacted to make the surface conform to original adjacent ground.

END OF SECTION

**INDEX TO**

**SECTION 31 25 00 – EROSION AND SEDIMENTATION CONTROLS**

# SECTION 31 25 00

# EROSION AND SEDIMENTATION CONTROLS

## PART 1 – GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Conditions apply to this section.

### 1.2 DESCRIPTION OF WORK

A. Extent of soil erosion control work includes all measures necessary to meet the requirements of this section.

Erosion and sediment control measures shall be installed prior to any construction activity.

Soil erosion and sediment control measures shall include all temporary and permanent means of protection and trapping soils of the construction site during land disturbing activity. Activity covered in this contract shall meet standards of NPDES General Permit for the state where work is performed.

### 1.3 PURPOSES

A. Contractor is to achieve the following goals:

1. Minimize soil exposure by proper timing of grading and construction.
2. Retain existing vegetation whenever feasible.
3. Vegetate and mulch denuded areas as soon as possible.
4. Divert runoff away from denuded areas.
5. Minimize length and steepness of slopes when it is practical.
6. Reduce runoff velocities with sediment barriers or by increasing roughness with stone.
7. Trap sediment on site.
8. Inspect and maintain erosion control measures.

### 1.4 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in the manufacture of soil erosion control systems products of types and sizes required, whose materials have been in satisfactory use for not less than 5 years.

B. Codes and Standards: Comply with all applicable Local, State, and Federal Standards pertaining to soil erosion control.

### 1.5 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data and installation instruction for soil erosion control materials and products.

### 1.6 MEASUREMENT AND PAYMENT

A. No unit measurements will be made for soil erosion control. Payment will be made at the lump sum price as shown on the bid proposal. The cost of soil erosion control shall include all equipment, labor and materials necessary to comply with the State of South Carolina Erosion and Sediment Control Program.

## PART 2 – PRODUCTS

### 2.1 GRASSING MATERIALS

A. Refer to Section 32 92 00 – Turf and Grasses.

1. General: All grass seed shall be free from noxious weeds, grade A recent crop, recleaned and treated with appropriate fungicide at time of mixture. Deliver to site in original sealed containers with dealer's guarantee as to year grown, percentage of purity, percentage of germination and date of the test by which percentages of purity and germination were determined. All seed sown shall have a date of test within six months of the date of sowing.

2. Type of Seed: Either Annual Rye or Common Bermuda Grass seed will be used depending on time of year in which seeding is to occur.

3. Mulch: Straw.

4. Fertilizer: Commercial balanced 4–12–12 fertilizer.

### 2.2 HAY BALES

A. Standard size, densely baled straw or hay, wrapped with synthetic or wire bands (two minimum per bale).

### 2.3 SILT FENCE

A. Silt fence shall be a woven geotextile fabric sheet. Fabric shall be a synthetic polymer composed of at least 85% by weight propylene, ethylene, amide, ester, or vinylidene chloride, and shall contain stabilizer and/or inhibitors added to the base plastic to make filaments resistant to deterioration due to ultra–violet and/or heat exposure. Fabric should be finished so the filaments will retain their relative position with respect to each other. Fabric shall be free of defects, rips, holes, or flaws.

Fabric shall meet the following requirements:

| Woven Fabrics | |
|---|---|
| Grab Strength | 90 lbs. |
| Burst Strength | 175 PSI |
| UV Resistance | 80% |

**2.4 CHEMICALS FOR DUST CONTROL**

A. Calcium Chloride, Anionic Asphalt Emulsion, latex Emulsion or Resin–in–Water Emulsion may be used for dust control.

**2.5 RIP–RAP**

A. Shall be hard quarry or field stone of such quality the pieces will not disintegrate on exposure to water, sunlight, or weather. Stone shall range in weight from a minimum of 25 pounds to a maximum of 125 pounds. At least 50 percent of the stone shall weigh more than 60 pounds. The stone shall have a minimum dimension of 12 inches.

**2.6 PRODUCT REVIEW**

A. Contractor shall provide the Engineer with a complete description of all products before ordering. Engineer will review all products before they are ordered.

## PART 3 – EXECUTION

**3.1 GENERAL**

A. All disturbed soil areas except those to support paving shall be graded and protected from erosion by grassing. Disturbed areas must be grassed within 14 days of work ending unless work is to begin again before 21 days. Storm water conveyance systems shall have sediment barriers installed at all entrances, intersections, change in direction and discharge points.

**3.2 GRASSING**

A. Refer to Section 32 92 00 – Turf and Grasses.

**3.3 SEDIMENT BARRIERS**

A. Hay Bales for Sheet Flow Applications:

1. Excavate a 4 inch deep trench the width of a bale and length of proposed barrier. Barrier should be parallel to the slope. Place barrier 5 to 6 feet away from toe of slope, unless otherwise instructed.

2. Place bales in the trench with their ends tightly abutting. Corner abutment is not acceptable. A tight fit is important to prevent sediment from escaping through spaces between the bales.

3. Backfill the trench with previously excavated soil and compact it. Backfill soil should conform to ground level on downhill side of barrier and should be built up to 4 inches above ground on uphill side of bales.

4. Inspect and repair or replace damaged bales promptly. Remove hay bales when uphill sloped areas have been permanently stabilized.

**B.** Rock Ditch Check

1. Excavate a 6 inch deep trench the width and length of proposed barrier. Install a non–woven geotextile fabric in the trench before placing rock for the ditch check.

2. The body of the ditch check shall be constructed of 12 inch rip–rap. The upstream face may be covered with 1–inch washed stone.

3. Ditch checks shall not exceed a height of 2 feet at centerline of the channel and have a minimum top flow length of 2 feet.

4. Rip–rap shall be placed over the channel banks to prevent water from flowing around ditch check. Rock must be installed by hand or mechanical placement (no dumping of rock) to achieve complete coverage of the ditch and ensure the center of the check is lower than the edges.

5. The maximum spacing between ditch checks shall be where the toe of the upstream check is at the same elevation as the top of the downstream check.

6. Contractor shall maintain ditch checks as required by State regulations.

## 3.4 SILT FENCE

A. Silt fence shall be placed at approximate location shown and installed in accordance with the detail on the construction drawings. Contractor shall maintain silt fence as required by state regulations.

## 3.5 DUST CONTROL

A. Dust raised from vehicular traffic will be controlled by wetting down access road with water or by the use of a deliquescent chemical, such as calcium chloride, if relative humidity is over 30%. Chemicals shall be applied in accordance with manufacturer's recommendations.

B. Contractor shall use all means necessary to control dust on and near the work, or off–site borrow areas when dust is caused by operations during performance of work or if resulting from the condition in which any subcontractor leaves the site. Contractor shall thoroughly treat all surfaces required to prevent dust from being a nuisance to the public, neighbors, and concurrent performance of work on site.

## 3.6 SEDIMENT BASIN

A. A sediment basin equal in volume to 3,600 cubic feet per disturbed acre is required. The sediment basin/lagoon adjacent to the outfall for the site shall be constructed and stabilized prior to any additional land disturbed activity.

**3.7 RIP–RAP**

A. Rip–Rap shall be placed at the locations shown and installed in accordance with the detail on the construction drawings.

**3.8 CONSTRUCTION EXIT**

A. Construct exit at the location shown per detail on the construction drawings. Contractor shall maintain construction exit as required by state regulations.

**3.9 INLET PROTECTION**

A. Install inlet protection per detail on the construction drawings. Contractor shall maintain inlet protection as required by state regulations until all disturbed surfaces are stabilized.

END OF SECTION

**INDEX TO**

**SECTION 31 37 00 – RIP–RAP**

# SECTION 31 37 00

# RIP–RAP

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Material placed as bank protection and erosion control.

### 1.2 RELATED SECTIONS

### 1.3 ALLOWABLE TOLERANCES

A. Depth of rip–rap blanket as shown on the drawings and in these specifications is a minimum depth.

### 1.4 MEASUREMENT AND PAYMENT

A. Rip–Rap: Payment will be included with erosions control lump sum price. Payment will include furnishing all labor, materials, and equipment and placing on a prepared surface.

### 1.5 REFERENCES (LATEST REVISION)

A. ASTM C 150 – Portland Cement.

## PART 2 – PRODUCTS

### 2.1 MATERIALS

A. Stone Rip–Rap: Shall be hard quarry or field stone of such quality the pieces will not disintegrate on exposure to water, sunlight, or weather. Stone shall be solid and non–friable and range in weight from a minimum of 25 pounds to a maximum of 150 pounds. At least 50 percent of the stone pieces shall weigh more than 60 pounds. The stone pieces shall have a minimum dimension of 12 inches. Documents indicating stone analysis, source and other pertinent data (i.e. – filter fabric) shall be submitted for review by the Engineer prior to delivery.

B. Sand–Cement Bag Rip–Rap:

1. Bags: Shall be of cotton, burlap, or fiber–reinforced paper capable of containing the sand–cement mixture without leakage during handling and placing. Bags previously used for any purpose shall not be used. Capacity shall be not less than 0.75 cubic foot nor more than two cubic feet.

2. Cement: Portland cement shall be Type I meeting requirements of ASTM C 150. Cement which has been damaged, or which is partially set, lumpy, or caked shall not be used.

3. Fine Aggregate: Shall be composed of hard, durable particles, free from injurious amounts of organic impurities and shall contain, in the material passing the No. 10 sieve, not more than 7 percent clay, and not more than 20 percent passing the No. 200 sieve.

C. Filter Fabric: Shall be a woven fabric of monofilament and multifilament yarn equivalent to Mirafi FW700. Fabric shall be finished so the filaments will retain their relative position with respect to each other. Fabric shall contain stabilizers and/or inhibitors added to make filaments resistant to deterioration due to ultraviolet and/or heat exposure. Fabric shall be free of flaws, rips, holes, or defects.

### 2.2 PRODUCT REVIEW

A. Contractor shall provide the Engineer with a complete description of all products before ordering. Engineer will review all products before they are ordered.

## PART 3 – EXECUTION

### 3.1 PREPARATION

A. The surface to receive rip–rap shall be prepared to a relatively smooth condition free of obstruction, depressions, debris, rises, and soft or low density pockets of material. Contours and elevations on construction drawings are to the surface of rip–rap material.

### 3.2 PLACEMENT

A. Filter fabric shall be placed with the long dimension running up slope. The strips shall be placed to provide a minimum width of one foot of overlap for each joint. Fabric shall be anchored in place with securing pins of the type recommended by fabric manufacturer. Pins shall be placed on or within 3 inches of the over–lap. Place fabric so upstream strip will overlap the downstream strip. Fabric shall be placed loosely to give and avoid stretching and tearing during placement of the stones.

B. Minimum depth or thickness of stone blanket shall be 12 inches with no under tolerance. Stones shall be dropped no more than three feet during construction. Placing shall begin at bottom of slope. Provide a toe trench if required as detailed on the construction drawings. Entire mass of stone shall be placed to conform with lines, grades, and thickness shown on the plans. Rip–rap shall be placed to its full course thickness at one operation and in such a manner as to avoid displacing the underlying material. Placing of rip–rap in layers, or by dumping into chutes, or by similar methods likely to cause segregation, will not be permitted.

Larger stones shall be well distributed and the entire mass of stone shall conform to gradation specified. All material used in rip–rap protection shall be placed

and distributed so there will be no large accumulations of either the larger or smaller sizes of stone.

It is the intent of these specifications to produce a fairly compact rip–rap protection in which all sizes of material are placed in their proper proportions. Hand placing or rearranging of individual stones by mechanical equipment may be required to secure the results specified.

C. Sand–Cement Bag Rip–Rap: Bags shall be uniformly filled. Bagged rip–rap shall be placed by hand with tied ends facing the same direction, with close, broken joints. After placing, bags shall be rammed or packed against one another to produce the required thickness and form a consolidated mass. The top of each bag shall not vary more than 3 inches above or below required plane. When directed by the Engineer or required by construction drawings, header courses shall be placed.

END OF SECTION

**INDEX TO**

**SECTION 32 11 23 – AGGREGATE BASE COURSES**

# SECTION 32 11 23

# AGGREGATE BASE COURSES

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Aggregate base course.

### 1.2 RELATED SECTIONS

A. Section 01 22 00 – Unit Prices: Requirements applicable for the work of this section.

B. Section 01 45 00 – Quality Control.

C. Section 31 00 00 – Earthwork

D. Section 32 12 16 – Asphalt Paving

### 1.3 MEASUREMENT AND PAYMENT

A. Aggregate Base Course: Payment will be made at the contract unit price. Payment will include supplying all material, labor, and equipment, stockpiling, scarifying substrate surface, placing where required, and compacting.

B. Prime Coat: Bituminous prime coat will not be measured for separate payment. All costs connected with applying prime coat will be included in the unit price bid for Aggregate Base Course.

### 1.4 REFERENCES (LATEST REVISION)

A. ASTM C 131 – Resistance to Degradation of Small–Size Course Aggregate by Abrasion and Impact in the Los Angeles Machine.

B. ASTM D 1557 – Laboratory Compaction Characteristics of Soil Using Modified Effort.

C. ASTM D 3740 – Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock Used in Engineering Design and Construction.

D. ASTM D 6938 – In–Place Density and Water Content of Soil and Soil–Aggregate by Nuclear Methods (Shallow Depth).

E. ASTM E 329 – Agencies Engaged in Construction Inspection, Testing, or Special Inspection.

### 1.5 QUALITY ASSURANCE

A. Perform work in accordance with the South Carolina Department of Transportation 2007 Standard Specifications for Highway Construction.

### 1.6 TESTING

A. Laboratory tests for moisture density relationship for fill materials shall be in accordance with ASTM D 1557, (Modified Proctor).

B. In place density tests in accordance with ASTM D 6938.

C. Testing laboratory shall operate in accordance with ASTM D 3740 and E 329 and be acceptable to the Engineer.

D. Testing laboratory and Project Engineer/Project Representative shall be given a minimum of 48 hours notice prior to taking any tests.

E. Testing shall be Contractor's responsibility and performed at Contractor's expense by a commercial testing laboratory operating in accordance with subparagraph C above.

F. Test results shall be furnished to the Engineer prior to continuing with associated or subsequent work.

## PART 2 – PRODUCTS

### 2.1 MATERIALS

A. Aggregate shall consist of processed and blended crushed stone. Aggregates shall be free from lumps and balls of clay, organic matter, objectionable coatings, and other foreign material and shall be durable and sound. Coarse aggregate shall have a percentage of wear not to exceed 65% after 500 revolutions as determined by ASTM C 131. Coarse aggregate shall meet applicable requirements of Section 800, Coarse Aggregate of the South Carolina Department of Transportation Standard Specifications Construction of Transportation Systems, 2021 Edition. Material shall meet the following gradation requirements of Section 815.

| Sieve Size | Percent by Weight Passing |
|---|---|
| 2" | 100 |
| 1–1/2" | 97 – 100 |
| 3/4" | 60 – 90 |
| #10 | 25 – 45 |
| #60 | 5 – 30 |
| #200 | 4 – 11 |

B. Prime Coat: Shall be EA–P Special, Emulsified asphalt, conforming to Section 407 of the South Carolina Department of Transportation 2007 Standard Specifications for Highway Construction.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. Verify subbase has been tested, is dry, and slopes and elevations are correct.

B. ON SITE OBSERVATIONS OF WORK: Owner's Representative or Engineer will have the right to require any portion of the work be completed in their presence. If the work is covered up after such instruction, it shall be exposed by Contractor for observation at no additional cost to the Owner. However, if Contractor notifies Owner such work is scheduled, and the Owner fails to appear within 48 hours, Contractor may proceed. All work completed and materials furnished shall be subject to review by the Owner, Engineer, or Project Representative. Improper work shall be reconstructed. All materials, which do not conform to requirements of specifications, shall be removed from the work upon notice being received from Engineer for rejection of such materials. Engineer shall have the right to mark rejected materials to distinguish them as such.

Contractor shall give the Owner, Project Engineer or Project Representative a minimum of 48 hours notice for all required observations or tests.

### 3.2 PREPARATION

A. Subbase shall be graded and shaped conforming to the lines, grades, and cross sections required and cleaned of all foreign substances prior to constructing base course. Do not place base on soft, muddy or frozen surfaces. Correct irregularities in subbase slope and elevation by scarifying, reshaping, and recompacting.

B. At the time of base course construction, subbase shall contain no frozen material.

C. Surface of subbase shall be checked by the Engineer or Project Representative for adequate compaction and surface tolerances. Ruts or soft yielding spots appearing in areas of subbase course having inadequate compaction, and areas not smooth or which vary in elevation more than 3/8 inch above or below required grade established on the plans, shall be corrected to the satisfaction of the Engineer or Project Representative. Base material shall not be placed until subbase has been properly prepared and test results have so indicated.

### 3.3 AGGREGATE PLACEMENT

A. Aggregate shall be placed in accordance with South Carolina Department of Transportation 2007 Standard Specifications for Highway Construction Section 305 and in accordance with all terms included in these specifications.

B. Level and contour surfaces to elevations and slopes indicated.

C. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.

D. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.

E. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

F. While at optimum moisture (± 1–1/2%), compact base course with rollers capable of obtaining required density. Vibratory, flatwheel, and other rollers accepted by the Engineer may be used to obtain required compaction. Rolling shall continue until base is compacted to 98% of the maximum laboratory dry density as determined by ASTM D 1557. In–place density of the compacted base will be determined in accordance with ASTM D 6938.

**3.4 PRIME COAT**

A. Bituminous material for the prime coat shall be applied uniformly and accurately in quantities of not less than 0.15 gallons per square yard nor more than 0.30 gallons per square yard of base course. All irregularities in the base course surface shall be corrected prior to application of prime coat. Clean the base course of all mud, dirt, dust, and caked and loose material

B. Do not apply prime to a wet surface nor when temperature is below 40°F in the shade. Do not apply prime when rain threatens nor when weather conditions prevent proper construction and curing of prime coat.

C. The primed base should be adequately cured before the binder or surface course is laid. In general, a minimum of 48 hours should be allowed for complete curing. Ordinarily, proper surface condition of the prime is indicated by a slight change in the shiny black appearance to a slightly brown color.

**3.5 TOLERANCES**

A. Flatness: Maximum variation of 1/4 inch measured with an acceptable 10–foot straight edge.

B. Scheduled Compacted Thickness: Within 3/8 inch.

C. Variation from Design Elevation: Within 3/8 inch.

D. Depth measurements for compacted thickness shall be made by test holes through the base course. Where base course is deficient, correct such areas by scarifying, adding base material, and recompacting as directed by the Engineer.

**3.6 FIELD QUALITY CONTROL**

A. Section 01 45 00 – Quality Control: Field observation.

B. Density and moisture testing will be performed in accordance with ASTM D 1557 and ASTM D 6938.

C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest.

D. Frequency of Tests:

1. Base Density and Thickness – One test per 5,000 square feet.

END OF SECTION

**INDEX TO**

**SECTION 32 11 26 – ASPHALTIC BASE COURSES**

# SECTION 32 11 26

# ASPHALTIC BASE COURSES

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Asphaltic Concrete Base Course

### 1.2 RELATED SECTIONS

A. Section 01 22 00 – Unit Prices

B. Section 01 45 00 – Quality Control

C. Section 31 00 00 – Earthwork

D. Section 32 12 16 – Asphalt Paving

### 1.3 MEASUREMENT AND PAYMENT

A. Asphaltic Concrete Base Course: Payment will be made at the contract unit price. Payment will include furnishing and placing base, compaction, testing, and all equipment, labor, and materials necessary to complete the work.

### 1.4 REFERENCES (LATEST REVISION)

A. ASTM D 946 – Penetration–Graded Asphalt Cement for Use in Pavement Construction.

B. ASTM E 329 – Agencies Engaged in Construction Inspection, Testing, or Special Inspections.

C. ASTM D 2726 – Bulk Specific Gravity and Density of Non–Absorptive Compacted Bituminous Mixtures.

D. ASTM D 2950 – Density of Bituminous Concrete in Place by Nuclear Methods.

E. ASTM D 3740 – Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock Used in Engineering Design and Construction.

F. AASHTO T 245 – Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus.

G. AASHTO T 179 – Effect of Heat and Air on Asphalt Materials (Thin–Film Oven Test).

H. AASHTO M 226 – Viscosity Graded Asphalt Cement.

### 1.5 QUALITY ASSURANCE

A. Perform work in accordance with South Carolina Department of Transportation 2007 Standard Specifications for Highway Construction.

B. Mixing Plant: Conform to South Carolina Department of Transportation 2007 Standard Specifications for Highway Construction.

### 1.6 ENVIRONMENTAL REQUIREMENTS

A. Do not place asphalt mixture when ambient air temperature is less than that indicated in the Table nor when the surface is wet or frozen.

| Lift Thickness | Min. Air Temperature, Degrees F. |
|---|---|
| 1" or Less | 55 |
| 1.1" to 2" | 45 |
| 2.1" to 3" | 35 |
| 3.1" to 4" | 30 |
| 4.1" to 8" | Contractor's Discretion |

B. Place bitumen mixture when mixture temperature is not more than 15 degrees F below bitumen supplier's bill of lading and not more than the maximum specified temperature.

### 1.7 TESTING

A. Testing laboratory shall operate in accordance to ASTM D 3740 and E 329 and shall be acceptable to the Engineer.

B. The testing laboratory and Project Engineer/Project Representative shall be given a minimum of 48 hours notice prior to taking any tests.

C. Testing shall be the responsibility of the Contractor and shall be performed at the Contractor's expense by a commercial testing laboratory operating in accordance with subparagraph A above.

D. Test results shall be furnished to the Engineer prior to continuing with associated or subsequent work.

## PART 2 – PRODUCTS

### 2.1 MATERIALS

A. Asphalt Cement: PG64–22 (SC).

B. Anti–Stripping: Anti–stripping agents or other additives required shall be acceptable to the Engineer prior to their use. Additive delivery systems shall be acceptable to the Engineer.

C. Aggregate shall consist of processed and blended crushed stone and be free of lumps and balls of clay, organic matter, objectionable coatings and other foreign material, and shall be durable and sound. Material shall meet applicable requirements of Section 310 of the South Carolina Department of Transportation Standard Specifications.

D. Base Mixture: Shall meet Section 310 of the South Carolina State Highway Department Standard Specifications.

### 2.2 SOURCE QUALITY CONTROL AND TESTS

A. Section [01 45 00 – Quality Control], [01 45 23 – Testing and Inspecting Services]. Provide mix design for asphalt.

B. Submit proposed mix design for review prior to beginning of work.

C. Test samples in accordance with the requirements of these specifications.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. Verify subbase has been tested, is dry, and gradients and elevations are correct.

B. ON–SITE OBSERVATIONS OF WORK: Owner's Representative or Engineer will have the right to require any portion of work be completed in their presence. If the work is covered up after such instruction, it shall be exposed by the Contractor for observation at no additional cost to Owner. However, if Contractor notifies Owner such work is scheduled, and Owner fails to appear within 48 hours, the Contractor may proceed. All work completed and materials furnished shall be subject to review by the Owner, Engineer, or Project Representative. Improper work shall be reconstructed. All materials, which do not conform to requirements of specifications, shall be removed from the work upon notice being received from Engineer for rejection of such materials. Engineer shall have the right to mark rejected materials to distinguish them as such.

Contractor shall give the Owner, Project Engineer or Project Representative a minimum of 48 hours notice for all required observations or tests.

### 3.2 PREPARATION

A. Subbase shall be leveled to lines and grades of plans and cleaned of all foreign substances prior to constructing the base course.

Do not place base on soft, muddy, or frozen surfaces.

Correct irregularities in subbase gradient and elevation by scarifying, reshaping, and recompacting.

B. At the time of base course construction, the subbase shall contain no frozen material.

C. The surface of subbase shall be checked by Engineer or Project Representative for adequate compaction and surface tolerances. Ruts or soft yielding spots appearing in areas of the subbase course having inadequate compaction, and areas not smooth or which vary in elevation more than 3/8 inch above or below required grade established on plans shall be corrected to satisfaction of Engineer or Project Representative. Base material shall not be placed until subbase has been properly prepared and test results have so indicated.

## 3.3 PLACEMENT

A. Construction shall be in accordance with Sections 310 and 401 of the South Carolina Department of Transportation Standard Specifications.

## 3.4 TOLERANCES

A. General: All paving shall be subject to visual and straightedge checking during construction operations and thereafter prior to final acceptance. A 10–foot straightedge shall be maintained in the vicinity of paving operation at all times for measuring surface irregularities on all paving courses. The straightedge and labor for its use shall be provided by Contractor. The surface of all courses shall be checked with a straightedge as necessary to detect surface irregularities. Irregularities such as ripping, tearing or pulling, which in the judgment of Engineer indicate a continuing problem in equipment, mixture or operating technique, will not be permitted to recur. The paving operation shall be stopped until appropriate steps are taken by Contractor to correct problem.

B. Flatness: Maximum variation of 1/4 inch measured with an acceptable 10 foot straight edge.

C. Scheduled Compacted Thickness: Within 3/8 inch under tolerance.

D. Variation from Design Elevation: Within 3/8 inch.

E. Base Deficient in Thickness: When measurement of any core indicates base is deficient in thickness, additional cores will be drilled 10 feet either side of the deficient core along centerline of lane until cores indicate thickness conforms to above specified requirements. A core indicating thickness deficiencies is considered a failed test. Base deficient in thickness shall be removed and replaced with the appropriate thickness of materials. If Contractor believes cores and measurements taken are not sufficient to indicate fairly the actual thickness of base, additional cores and measurements will be taken, provided Contractor will bear extra cost of drilling cores and filling holes in roadway as directed.

## 3.5 FIELD QUALITY CONTROL

A. Section 01400 – Quality Assurance: Field Observation.

B. Density Testing: Performed in accordance with ASTM D–2726 and ASTM D–2950. Core samples for each day's operation shall be taken, tested and results reported to Engineer the following day. The areas sampled shall be properly restored by Contractor at no additional cost to Owner. Compaction must be accomplished

when the temperature of mix is above 185 degrees F and below 300 degrees F. Nuclear gauge tests shall be taken during the asphaltic concrete placement.

C. Density of each pavement course shall conform to one of the following:

1. Average 96% of laboratory density with no test less than 94%.

2. Average 92% of maximum theoretical density with no test less than 90%.

3. Average 99% of control strip density.

D. Temperature:

1. Asphaltic concrete shall not exceed 325 degrees F at any time.

2. Temperature at time of loading shall be recorded on the truck delivery ticket.

E. Frequency of Tests:

1. Asphaltic Concrete – One test for each 250 tons placed.

a. Asphalt extraction and gradation test.

b. Core Sample

2. Field determination of density by nuclear method every 5,000 square feet during construction of the base course.

END OF SECTION

**INDEX TO**

**SECTION 32 12 16SC – ASPHALT PAVING**

# SECTION 32 12 16SC

# ASPHALT PAVING

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Surface Course

B. Binder Course

### 1.2 RELATED SECTIONS

A. Section 01 22 00 – Unit Prices

B. Section 01 45 00 – Quality Control

C. Section 31 00 00 – Earthwork

D. Section 32 11 23 – Aggregate Base Courses

E. Section 32 11 26 – Asphaltic Base Courses

### 1.3 MEASUREMENT AND PAYMENT

A. Asphaltic Concrete Binder Course: Will be paid for at the contract unit price per square yard of completed and accepted binder course for the thickness specified.

B. Asphaltic Concrete Surface Course: Will be paid for at the contract unit price per square yard of completed and accepted surface course for the thickness specified.

C. Tack Coat: Will be paid for at the contract unit price per square yard of base or pavement covered.

D. Payment for pavement and tack coat will be in full for preparing and cleaning, providing all materials, labor and equipment including placing, compacting and testing.

### 1.4 REFERENCES (LATEST REVISION)

A. ASTM D 946 – Penetration–Graded Asphalt–Cement for Use in Pavement Construction.

B. ASTM D 1188 – Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples.

C. ASTM D 1754 – Effect of Heat and Air on Asphaltic Materials (Thin–film Oven Test).

D. ASTM D 2726 – Bulk Specific Gravity and Density of Non–Absorptive Compacted Bituminous Mixtures.

E. ASTM D 2950 – Density of Bituminous Concrete in Place by Nuclear Methods.

F. ASTM D 3740 – Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock Used in Engineering Design and Construction.

G. ASTM E 329 – Agencies Engaged in Construction Inspection, Testing, or Special Inspection.

## 1.5 QUALITY ASSURANCE

A. Perform work in accordance with South Carolina Department of Transportation 2007 Standard Specifications for Highway Construction.

B. Mixing Plant: Conform to South Carolina Department of Transportation 2007 Standard Specifications for Highway Construction.

C. Method of Measurement for Handicap Parking and Access Aisle will be with a 24-inch digital smart-level. The 24-inch smart-level slope readings greater than specified tolerance within contract documents will be identified as non-compliant and not accepted.

## 1.6 ENVIRONMENTAL REQUIREMENTS

A. Do <u>not</u> place asphalt mixture when ambient air temperature is less than that indicated in the Table nor when the surface is wet or frozen.

| Lift Thickness | Min. Air Temperature, Degrees F. |
|---|---|
| 1" or Less | 55 |
| 1.1" to 2" | 45 |
| 2.1" to 3" | 40 |
| 3.1" to 4.5" | 35 |

B. Mixture shall be delivered to the spreader at a temperature between 250 degrees F and 325 degrees F.

## 1.7 GUARANTEE

A. Contractor shall guarantee the quality of materials, equipment, and workmanship for a period of 12 months after acceptance. Defects discovered during this period shall be repaired by the Contractor at no cost to the Owner.

## 1.8 TESTING

A. Testing laboratory shall operate in accordance with ASTM D 3740 and E 329 and be acceptable to the Engineer.

B. Testing laboratory and Project Engineer/Project Representative shall be given a minimum of 48 hours notice prior to taking any tests.

C. Testing shall be Contractor's responsibility and shall be performed at Contractor's expense by a commercial testing laboratory operating in accordance with subparagraph A above.

D. Test results shall be furnished to the Engineer prior to continuing with associated or subsequent work.

## PART 2 – PRODUCTS

### 2.1 TACK COAT

A. Shall consist of asphalt binder (asphalt cement) or emulsified asphalt, conforming to Section 401 of the South Carolina Department of Transportation 2007 Standard Specifications for Highway Construction. Asphalt binder shall be PG64–22. The acceptable grades of emulsified asphalt are RS–1, MS–1, MS–2, HFMS–1, HFMS–2, SS–1, CRS–1, CRS–2, CMS–2, and CSS–1.

### 2.2 ASPHALT BINDER AND ADDITIVES

A. Shall be PG64–22 and conform to Section 401 of the South Carolina Department of Transportation 2007 Standard Specifications for Highway Construction.

B. Anti–Stripping: Shall be hydrated lime and conform to requirements of Section 401 of the South Carolina Department of Transportation 2007 Standard Specifications for Highway Construction.

### 2.3 AGGREGATES

A. General: Mineral aggregate shall be composed of fine aggregate or a combination of fine and coarse aggregate. Coarse aggregate shall be that portion of the material retained on a No. 4 sieve.

Fine aggregate shall be considered that portion passing the No. 4 sieve. Fine aggregate, coarse aggregate, and any additives in combination with the specified percentage of asphalt cement shall meet the requirements of tests specified, before acceptance may be given for their individual use. Marine (Fossiliferous) limestone shall not be used.

B. Fine Aggregate: Shall conform to the requirements of Section 401 of the South Carolina Department of Transportation 2007 Standard Specifications for Highway Construction.

C. Coarse Aggregate: Shall be granite stone and conform to the requirements of Section 401 of the South Carolina Department of Transportation 2007 Standard Specifications for Highway Construction.

D. Surface Course: The surface course shall consist of fine and coarse aggregate and mineral filler uniformly mixed with hot asphalt binder in an acceptable mixing plant. The plant shall conform to South Carolina Department of Transportation 2007 Standard Specifications for Highway Construction. The gradations, asphalt content and air voids shall be the following:

| **TYPE C** | |
|---|---|
| Square Sieve | % Passing |
| 3/4 inch | 100 |
| 1/2 inch | 97 – 100 |
| 3/8 inch | 83 – 100 |
| No. 4 | 58 – 80 |
| No. 8 | 42 – 62 |
| No. 30 | 20 – 40 |
| No. 100 | 8 – 20 |
| No. 200 | 3 – 9 |
| % Asphalt Binder | 5.0 – 6.8 |
| Air Voids, % | 3.5 – 4.5 |

E. Intermediate or Binder Course: The mineral aggregates and asphalt binder shall be combined in such proportions the composition by weight of the finished mixture shall be within the following range limits:

| **TYPE B** | |
|---|---|
| Sieve Designation | Percentage by Weight Passing |
| 1 inch | 100 |
| 3/4 inch | 90 – 100 |
| 1/2 inch | 75 – 90 |
| 3/8 inch | 64 – 80 |
| No. 4 | 38 – 54 |
| No. 8 | 22 – 36 |
| No. 30 | 8 – 22 |
| No. 100 | 3 – 10 |
| No. 200 | 2 – 8 |
| % Asphalt Binder | 4 – 6 |
| Air Voids, % | 3.5 – 4.5 |

## 2.4 SOURCE QUALITY CONTROL AND TESTS

A. Section 01 45 00 – Quality Control and Section 01 45 23 – Testing and Inspecting Services.

B. Submit proposed mix design for review prior to beginning of work.

C. Test samples in accordance with the requirements of these specifications.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. On–Site Observations: Owner's Representative or Engineer will have the right to require any portion of work be completed in their presence. If work is covered up after such instruction, it shall be exposed by the Contractor for observation at no additional cost to Owner. However, if Contractor notifies Engineer such work is scheduled, and Engineer fails to appear within 48 hours, the Contractor may proceed. All work completed and materials furnished shall be subject to review by the Engineer or Project Representative. Improper work shall be reconstructed. All materials, which do not conform to requirements of specifications, shall be removed from the work upon notice being received from Engineer for rejection of such materials. Engineer shall have the right to mark rejected materials to distinguish them as such.

Contractor shall give the Owner, Project Engineer or Project Representative a minimum of 48 hours notice for all required observations or tests.

B. Contractor shall verify base has been tested, is dry, and slopes and elevations are correct.

### 3.2 PREPARATION

A. Apply tack coat in accordance with Section 401 of the South Carolina Department of Transportation 2007 Standard Specifications for Highway Construction. Rate of application shall be 0.05 to 0.15 gallons per square yard of surface.

B. Work shall be planned so no more tack coat than is necessary for the day's operation is placed on the surface. All traffic not essential to the work shall be kept off the tack coat.

C. Apply tack coat to contact surfaces of curbs and gutters. Apply in manner so exposed curb or gutter surfaces are not stained.

D. Coat surfaces of manhole frames and inlet frames with oil to prevent bond with asphalt pavement. Do <u>not</u> tack coat these surfaces.

### 3.3 PLACEMENT

A. Construction shall be in accordance with Sections 401, 402, and 403 of the South Carolina Department of Transportation 2007 Standard Specifications for Highway Construction.

B. Asphaltic concrete shall not be placed on a wet or frozen surface.

C. Compaction shall commence as soon as possible after the mixture has been spread to the desired thickness. Compaction shall be continuous and uniform over the entire surface. Do not displace or extrude

pavement from position. Hand compact in areas inaccessible to rolling equipment. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks. Compaction rolling shall be complete before material temperature drops below 175° F.

D. Areas of pavement with deficient thickness or density shall be removed and replaced at no additional cost to the Owner.

## 3.4 TOLERANCES

A. General: All paving shall be subject to visual and straightedge evaluation during construction operations and thereafter prior to final acceptance. A 10–foot straightedge shall be maintained in the vicinity of the paving operation at all times for the purpose of measuring surface irregularities on all paving courses. The straightedge and labor for its use shall be provided by the Contractor. The surface of all courses shall be checked with the straightedge as necessary to detect surface irregularities. Irregularities such as rippling, tearing or pulling, which in the judgment of the Engineer indicate a continuing problem in equipment, mixture or operating technique, will not be permitted to recur. The paving operation shall be stopped until appropriate steps are taken by the Contractor to correct the problem.

B. Flatness: All irregularities in excess of 1/8 inch in 10 feet for surface courses and 1/4 inch in 10 feet for intermediate courses shall be corrected.

C. Variation from Design Elevation:

1. General Paving: Less than 1/4 inch.

2. Accessible Routes: Shall not exceed 1/4 inch. However, accessible routes shall not exceed maximum ADA allowable slopes. Contractor shall remove and replace any and all portions of the accessible route that exceed maximum ADA allowable slopes.

D. Scheduled Compacted Thickness: Within 1/4 inch per lift.

E. Pavement Deficient in Thickness: When measurement of any core indicates the pavement is deficient in thickness, additional cores will be drilled 10 feet either side of the deficient core along the centerline of the lane until the cores indicate the thickness conforms to the above specified requirements. A core indicating thickness deficiencies is considered a failed test. Pavement deficient in thickness shall be removed and replaced with the appropriate thickness of materials. If the Contractor believes the cores and measurements taken are not sufficient to indicate fairly the actual thickness of the pavement, additional cores and measurements will be taken, provided the Contractor will bear the extra cost of drilling the cores and filling the holes in the roadway as directed.

## 3.5 FIELD QUALITY CONTROL

A. Acceptance of the in–place density of the binder and surface courses shall be in accordance with the South Carolina Department of Transportation 2007 Standard Specifications for Highway Construction and these specifications.

B. Density Testing: Performed in accordance with ASTM D–2726 and ASTM D–2950. Core samples for each day's operation shall be taken, tested and results reported to the Engineer the following day. The areas sampled shall be properly restored by the Contractor at no additional cost to the Owner. Nuclear gauge tests shall be taken during the asphaltic concrete placement.

C. Density of each pavement course shall conform to one of the following:

1. Average 96% of laboratory density with no test less than 94%.

2. Average 92% of maximum theoretical density with no test less than 90%.

3. Average 99% of control strip density.

D. Temperature:

1. Asphaltic concrete shall not exceed 325 degrees F at any time.

2. Asphaltic concrete shall not be placed once the temperature of the mix falls below 250 degrees F or the delivered temperature is more than 15 degrees F below the batch plant's delivery ticket.

3. Temperature at time of loading shall be recorded on the truck delivery ticket.

E. Frequency of Tests:

1. Asphaltic Concrete – One test for each 250 tons placed.

a. Asphalt extraction and gradation test.

b. Core Sample

2. Field determination of density by nuclear method every 5,000 square feet during construction of the asphaltic concrete binder/surface course.

END OF SECTION

**INDEX TO**

**SECTION 32 92 00 – TURF AND GRASSES**

# SECTION 32 92 00

# TURF AND GRASSES

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Seeding, planting grass, and fertilizing graded areas behind the structures, pipeline rights–of–way, roadway shoulders, and other disturbed areas.

B. Seed protection.

C. Maintaining seeded areas until final acceptance.

### 1.2 RELATED WORK

A. Civil and Landscape plans and specifications.

### 1.3 DELIVERY, STORAGE, AND HANDLING

A. Deliver grass seed in original containers showing analysis of seed mixture, percentage of pure seed, year of production, net weight, date of packaging, and location of packaging. Damaged packages are not acceptable. Store in cool, dry locations away from contaminants.

B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer. Damaged bags are not acceptable. Store in cool, dry locations away from contaminants.

C. Deliver sod on pallets.

D. All material shall be acceptable to Engineer prior to use.

### 1.4 PLANTING DATES

A. This specification provides for establishment of a permanent grass cover between the dates of March 1 and September 30. If finished earth grades are not completed in time to permit planting and establishment of permanent grass during the favorable season between dates specified above unless otherwise accepted, Contractor will be required to plant a temporary cover to protect new graded areas from erosion and to keep windborne dust to a minimum. The temporary cover shall be planted between October 1 and February 28 unless otherwise permitted.

### 1.5 MEASUREMENT AND PAYMENT

A. When the season or stage of project is such results of grassing work cannot be determined, conditional acceptance will be made on work completed. When conditional acceptance is made for items of work covered, Contractor shall be entitled to 50% of bid price for the actual work placed and shall receive remaining 50% of bid price when final acceptance is made. Conditional acceptance shall not apply to the remaining items of work, and full bid price payment shall be made

when work is acceptably placed and completed in accordance with specifications.

B. Payment for grassing will be made at contract unit price for the item "Grassing" and such payment shall constitute full compensation for furnishing and placing seed and fertilizer or sod where directed and protecting and maintaining seed and sod in all graded and disturbed areas.

## PART 2 – PRODUCTS

A. Contractor shall submit source and species certification documents to Engineer and Owner's Representative for review prior to installation. Supply complete information on all analysis/test methodologies and results; laboratory certifications, manufacturer's specifications, and agency approvals to the Landscape Architect/Project Engineer prior to placement of soil mixtures. In addition, provide the Landscape Architect/Project Engineer with thoroughly mixed sample of soil mixes for acceptance prior to placement. Landscape Contractor shall make modifications and improvements to soil mixes deemed necessary by the soil analysis to meet requirements specified here in before, and to ensure proper growing medium for plant material.

### 2.1 SEED

A. All seed shall conform to State Laws and requirements and regulations of the State Department of Agriculture.

B. The varieties of seed, as specified in Section 2.2, shall be individually packaged or bagged, and tagged to show name of seed, net weight, origin, germination, lot number, and other information required by the State Department of Agriculture.

C. Engineer reserves the right to test, reject, or accept all seed before seeding.

### 2.2 SEEDING SCHEDULE

A.

| SEED | RATE | PLANTING DATES |
|---|---|---|
| Bermuda | 15–lbs/acre | March 1 – September 30 |
| Rye | 75–lbs/acre | October 1 – February 28 |

### 2.3 FERTILIZER

A. Commercial fertilizer of accepted type, conforming to State fertilizer laws at the rate as recommended by soils test.

### 2.4 LIME

A. Agricultural grade, ground limestone at the rate as recommended by soils test.

### 2.5 SPRIG

A. Healthy living stems, stolons, or rhizomes and attached roots of locally adapted grass without adhering soil, including two to three nodes and from 4 to 6 inches long. Obtain from heavy, dense certified sod. Provide sprigs which have been grown under climatic conditions similar to those in the locality of project. Coordinate harvesting and planting operations to prevent exposure of sprigs to the sun for more than 30 minutes before covering and moistening. Sprigs showing signs of wilt, mold, containing weeds, or other detrimental material or are heat damaged will be rejected.

B. Varieties of sprig, as specified in section 2.6, shall be individually packaged or bagged, and tagged to show name of sprig, net weight, origin, and other information required by the State Department of Agriculture.

C. Sprigs shall be pure to variety specified and shall be free of other grass species, weeds or foreign matter.

D. Sprigs shall be harvested by digging (not collected above soil level), shredding sod, rototilling sod and raking, vericutting, or with a sprig harvester. Sprigs shall consist of mostly rhizomes and crowns with only a few green leaves.

## 2.6 SPRIGGING SCHEDULE

A.

| SPRIG | RATE | PLANTING DATES |
|---|---|---|
| 'Tifsport' Bermuda | 1,000 bushels/acre (Maximum 12 week grow-in) | April 1 – August 31 |
| Stabilize site with temporary grass seed | | September 1 – March 31 (See section 2.2) |

B. In areas where existing grass is to be matched, Contractor shall sprig at the rate and dates recommended by sprig distributor.

## 2.7 SOD

A. Sod shall be premium grade, densely rooted, good quality grass of the species and certified variety as shown on the plans, free from noxious weeds with no surface soil being visible. The sod shall be obtained from areas where the soil is reasonably fertile. Sod of specified species shall be grown from seed or sprig with not less than 95 percent germination, 85 percent pure seed, and not more than 0.5 percent weed seed. The sod shall be machine cut to a uniform soil thickness that shall contain practically all of the dense root system and not be less than 1–inch thick.

B. Before cutting, sod shall be mowed to a height of not less that 1–1/2-inches or more than 2-inches. Sod shall be cut in minimum uniform widths of 12-inches and lengths of 24 inches.

C. Sod shall be delivered to site in a fresh, moist condition with healthy green foliage. It shall be unloaded from delivery trucks on pallets or in rolls and placed in final position within 24 hours of delivery. Sod shall be protected from wind and sun and shall not be allowed to dry out before planting.

D. Sod shall be strong enough to support its own weight and retain its size and shape when suspended vertically from a firm grasp on the upper 10 percent of the section.

### 2.8 ACCESSORIES

A. Straw Mulch: Oat or wheat straw, reasonably free from weeds, foreign matter detrimental to plant life, and in dry condition.

B. Excelsior Mulch: Excelsior mulch shall consist of wood fibers cut from sound, green timber. The average length of fibers shall be 4 to 6 inches. Cut shall be made in such a manner as to provide maximum strength of fiber, but at a slight angle to natural grain of the wood to cause splintering of fibers when weathering in order to provide adherence to each other and to soil.

C. Wood cellulose fiber shall be made from wood chip particles manufactured particularly for discharging uniformly on the ground surface when dispersed by a hydraulic water sprayer. It shall remain in uniform suspension in water under agitation and blend with grass seed and fertilizer to form a homogenous slurry. Mulch fibers shall intertwine physically to form a strong moisture holding mat on the ground surface and allow rainfall to percolate into underlying soil. The mulch shall be heat processed to contain no germination or growth-inhibiting factors. It shall be dyed (non-toxic) an appropriate color to facilitate metering of material.

### 2.9 PRODUCT REVIEW

A. Contractor shall provide the Engineer with a complete description of all products before ordering. The Engineer will review all products before they are ordered.

## PART 3 – EXECUTION

### 3.1 PREPARATION

A. Areas to be seeded shall be made smooth and uniform and shall conform to the finished grade indicated on plans.

B. Remove foreign materials, plants, roots, stones, and debris from surfaces to be seeded.

C. Grassing areas, if not loose, shall be loosened to a minimum depth of 3 inches before fertilizer, seed or sod is applied.

D. Amendments to soils shall be incorporated into loosened 3-inch top soil layer as recommended by soils tests.

E. Contractor shall provide Topsoil Analysis Tests performed by a State Agricultural Experiment Station, Soil and Water Conservation District, State University, or other qualified private testing laboratory, as acceptable to Landscape Architect/Project Engineer. Soils test shall identify existing pH and nutrient levels, as well as recommended adjustments based on the type of grass to be installed.

## 3.2 STAND OF GRASS

A. Before acceptance of seeding, sodding, or sprigging is performed for the establishment of permanent vegetation, Contractor will be required to produce a satisfactory stand of perennial grass whose root system shall be developed sufficiently to survive dry periods and winter weather and be capable of re-establishment in spring.

B. Before acceptance of seeding is performed for the establishment of temporary vegetation, Contractor will be required to produce a stand of grass sufficient to control erosion for a given area and length of time before the next phase of construction or establishment of permanent vegetation is to commence.

## 3.3 SEEDING AND SPRIGGING DATES

A. Seeding and sprigging shall be performed during periods and at rates specified in their respective schedules. Seeding and sprigging work may, at discretion of Contractor, be performed throughout the year using schedule prescribed for given period. Seeding and sprigging work shall not be conducted when the ground is frozen or excessively wet. Contractor will be required to produce a satisfactory stand of grass regardless of the period of year work is performed.

## 3.4 APPLYING LIME AND FERTILIZER

A. Following advance preparation and placing selected material for shoulders and slopes, lime and fertilizer, if called for based on soil tests, shall be spread uniformly over the designated areas, and shall be thoroughly mixed with the soil to a depth of approximately 2 inches. Fertilizer and lime shall be applied at the rate recommended by required soils test. Unless otherwise provided, lime will not be applied for temporary seeding. In all cases where practicable, acceptable mechanical spreaders shall be used for spreading fertilizer. On steep slopes subject to slides and inaccessible to power equipment, the slopes shall be adequately scarified. Fertilizer may be applied on steep slopes by hydraulic methods as a mixture of fertilizer and seed. When fertilizer is applied with combination seed and fertilizer drills, no further incorporation will be necessary. The fertilizer and seed shall be applied together when Wood Cellulose Fiber Mulch is used. Any stones larger than 2-1/2 inches in any dimension, larger clods, roots, or other debris brought to the surface shall be removed.

## 3.5 SEEDING

A. Seed shall be sown within 24 hours following application of fertilizer and lime and preparation of the seedbed as specified in Section 3.4. Seed shall be uniformly sown at rate specified by the use of acceptable mechanical seed drills. Rotary hand seeders, power sprayers or other satisfactory equipment may be used on steep slopes or on other areas inaccessible to seed drills.

B. Seeds shall be covered and lightly compacted by means of cultipacker or light roller if the drill does not perform this operation. On slopes inaccessible to compaction equipment, the seed shall be covered by dragging spiked chains, by light harrowing or by other satisfactory methods.

C. Apply water with fine spray immediately after each area has been sown.

D. Do not sow seed when ground is too dry, during windy periods or immediately following a rain.

E. If permitted by the special provisions, wood cellulose fiber mulch or excelsior fiber mulch may be used.

**3.6 SEED PROTECTION (STRAW MULCH)**

A. All seeded areas seeded with permanent grasses shall be uniformly mulched in a continuous blanket immediately following seeding and compacting operations, using at least 2 tons of straw per acre.

**3.7 SEED PROTECTION (EXCELSIOR MULCH)**

A. Seed shall be sown as specified in Section 3.5. Within 24 hours after covering of seed, excelsior mulch shall be uniformly applied at the rate of 2 tons per acre. The mulch may be applied hydraulically or by other acceptable methods. Should the mulch be placed in a dry condition, it shall be thoroughly wetted immediately after placing. Engineer may require light rolling of the mulch to form a tight mat.

**3.8 SEED PROTECTION (WOOD CELLULOSE FIBER MULCH)**

A. After the lime has been applied and ground prepared as specified in Section 3.4, wood cellulose fiber mulch shall be applied at a rate of 1,500 pounds per acre in a mixture of seed and fertilizer. Hydraulic equipment shall be used for application of fertilizer, seed, and slurry of the prepared wood pulp. This equipment shall have a built-in agitation system with an operating capacity sufficient to agitate, suspend, and homogeneously mix a slurry of the specified amount of fiber, fertilizer, seed, and water. The slurry distribution lines shall be large enough to prevent stoppage. The discharge line shall be equipped with a set of hydraulic spray nozzles which will provide an even distribution of slurry on various areas to be seeded. The slurry tank shall have a minimum capacity of 1,000 gallons.

Seed, fertilizer, wood pulp mulch, and water shall all be combined into the slurry tank for distribution of all ingredients in one operation by hydraulic seeding method specified herein. Materials shall be combined in a manner recommended by the manufacturer. The slurry mixture shall be regulated so amounts and rates of application shall result in a uniform application of all materials at rates not less than amount specified. Using the color of wood pulp as a guide, equipment operator shall spray prepared seedbed with a uniform visible coat. The slurry shall be applied in a sweeping motion, in an arched stream to fall like rain, allowing wood fibers to build upon each other until an even coat is achieved.

**3.9 SPRIGGING**

A. Sprigs shall be placed at the date and rates as shown in section 2.6. The sprigging method shall be by broadcast sprigging, hydroplanting or row planter. Sprigging procedure shall ensure even coverage.

B. Sprigs applied by broadcast over the site with a distributor or hydroseeder shall be planted at the rates listed in section 2.6. Cover broadcast sprigs with straw mulch immediately after broadcast and water in immediately (within 2 hours).

C. Sprigs installed by row planter creating a narrow furrow that covers 50 to 80% of

the sprig with soil may use less sprig material. Rate shall be as recommended by sprig supplier to provide a solid stand of turf within the time required in Section 2.6. Water in immediately (within 1 hour).

## 3.10 SODDING

A. Sod shall be placed between March 1st and December 1st. However, if sod is to be placed during periods of temperatures over 90 degrees F., the Contractor shall take extra care for quick placement of sod with adequate, consistent watering necessary to ensure sod thrives as planted.

B. Sod shall be placed within 24 hours of cutting.

C. Place top elevation of sod 1/2 inch below adjoining paving or curbs.

D. All areas to be sodded shall be brought to the proper line grade or cross section as was existing prior to construction. Sod shall be placed so, upon completion, edges of sodded areas will be smooth and will conform to the proposed finished grade. Sod shall be laid smooth, edge to edge, with staggered joints. Sod shall be immediately pressed firmly into contact with the sod bed by tamping or rolling, to eliminate any air pockets. A true and even surface shall be provided, to insure knitting without displacement of the sod or deformation of the sodded areas surfaces. Do not stretch or overlap sod pieces. Following compaction, screened soil of good quality shall be used to fill all cracks. Excess soil shall be worked into the grass with rakes or other suitable equipment. On slopes steeper than 3 to 1, sod shall be fastened in place with suitable wood or metal pins to hold the sod in place. Any damage by erosion or other causes occurring after completion of grading operations shall be repaired, before commencing with the sodding operations.

E. Immediately before sodding, moisten topsoil with a fine spray to a minimum 1-inch depth. Sod shall not be laid on dry or powdery soil.

F. Sod shall be moist when laid and placed on moist ground. The sod shall be carefully placed by hand, beginning at the toe of slopes and working upwards. The length of strips shall be at right angles to flow of surface water. All joints shall be tightly butted and end joints shall be staggered at least 12 inches. Sod shall be immediately pressed firmly into the ground by tamping or rolling. Fill all joints between strips with fine screened soil. Sod on slopes shall be pegged with sod pegs to prevent movement.

G. Within two hours after sod has been placed, thoroughly water to a minimum depth of 4-inches. After sod and soil have dried, roll sodded areas to ensure good bond between sod and soil and to remove depressions and irregularities. Roll sodded areas with a roller not exceeding 150 lbs. per foot of roller width.

# PART 4 – MAINTENANCE, WARRANTY AND ACCEPTANCE

## 4.1 MAINTENANCE

A. Maintain grassed surfaces until final acceptance.

B. Maintenance shall consist of providing protection against traffic, watering to

ensure uniform seed germination and to keep surface of soil damp, and repairing any areas damaged as a result of construction operations or erosion. Maintenance shall also include, but is not limited to, watering, weeding, cultivating, removal of dead material, lawn mowing, fertilizing, and other necessary operations.

C. The Contractor shall maintain all proposed plantings until the date of substantial completion issued by the Owner.

**4.2 WARRANTY**

A. All grassed areas shall be guaranteed by Contractor to be alive and healthy for a one year period from date of substantial completion issued by the Owner. A final walk through with the Owner shall be conducted at end of warranty period to determine if any areas require replanting. At end of warranty period, sod shall show evidence of rooting to underlying soil and shall have no competitive weed growth from either the sod or from between sod joints.

B. Any grassed area which is dead or not showing satisfactory growth shall be replaced at Contractor's expense at the end of warranty period. All replacement shall be of original quality. Replacement required because of vandalism, excessive use, or other causes beyond the control of Contractor are not part of this contract.

**4.3 ACCEPTANCE**

A. Before acceptance of seeding performed for the establishment of permanent vegetation, Contractor will be required to produce a satisfactory stand of perennial grass whose root system shall be developed sufficiently to survive dry periods and winter weather and be capable of reestablishment in spring.

B. A minimum coverage of 80% density over 100% of the disturbed area is required for seeded areas before project acceptance. Sprig and sod areas shall have 95% coverage over 100% of the disturbed area prior project acceptance.

END OF SECTION

**INDEX TO**

**SECTION 33 01 30.73 –SEWER UTILITIES PIPE BURSTING**

# SECTION 33 01 30.73

# SEWER UTILITIES PIPE BURSTING

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Rehabilitation of sewer lines by pipe bursting method.

B. Connect to existing manholes.

C. Video observation.

D. Equipment.

E. Sewer service connection.

F. Bypass pumping.

G. Pipe joining.

### 1.2 RELATED SECTIONS

A. Section 01 55 26 – Traffic Control.

B. Section 31 00 00 – Earthwork.

### 1.3 OPTIONS

A. The specifications describe several materials and types of equipment. Where manufacturers and models of equipment are named in the specifications, it is intended these are to describe quality and function required. Contractor may use equipment or materials of other manufacturers provided they are reviewed and accepted by the Engineer and Owner as equivalent to those specified.

### 1.4 REFERENCES (Latest Revision)

A. ASTM D 3350 – Polyethylene Plastics Pipe and Fittings Materials.

B. ASTM D 3740 – Minimum requirements for agencies engaged in testing and/or inspection of soil and rock as used in engineering design and construction.

C. ASTM D 4976 – Polyethylene Plastics Molding and Extrusion Materials

D. ASTM E 329 – Agencies Engaged in Construction Inspection and/or Testing.

E. ASTM F 714 – Polyethylene (PE) Plastic Pipe (SDR–PR) Based on Outside Diameter

## 1.5 SUBMITTALS

A. Submit the following Contractor's Drawings:

1. Shop drawings, catalog data, and manufacturer's technical data showing complete information material composition, physical properties, and dimensions of new pipe and fittings. Include manufacturer's recommendations for handling, storage, and repair of pipe and fittings damaged.

2. Method of construction and restoration of existing sewer service connections. This shall include:

   a. Detail drawings and written descriptions of the entire construction procedure to install pipe, bypass sewage flow, and reconnection of sewer service connections.

3. Certification of workmen training for installing pipe.

4. Video observation reports and recordings made after new pipe installation.

## 1.6 MEASUREMENT AND PAYMENT

A. Replacing Sewer by Pipe Bursting – Measurements will be made between the centers of manholes or to other pipe ends. Payment will be made at the contract unit price per linear foot of replacing sewer by pipe bursting for each pipe diameter. Payment shall include excavation of launching pit, cleaning, preparation of existing pipe to receive new pipe, pipe bursting, new pipe, pipe bedding, annulus sealing material, backfill material, compaction, testing, video observation, furnishing and placing all materials, labor, tools and equipment, and performance of all operations necessary to complete the work.

B. Video Observation – Payment for video of rehabilitated pipe shall be considered subsidiary to the cost of pipe rehabilitation and shall not be a separate pay item.

C. By–pass Pumping – Payment for any necessary by–pass pumping shall be considered subsidiary to the cost of pipe rehabilitation and shall not be a separate pay item.

D. Service Reconnection – Payment will be made at the contract lump sum price for each connection made, and will include locating existing service, reconnection to main line, testing and all materials, labor, tools and equipment necessary to complete job.

## 1.7 QUALITY ASSURANCE

A. Contractor will furnish the Engineer and Owner a description of all material before ordering. Engineer will review the Contractor's submittals and provide in writing an acceptance or rejection of material.

B. Contractor shall be certified by the particular pipe bursting system manufacturer used on this project.

C. Material and equipment shall be the standard product of a company who has manufactured them for a minimum of 2 years and who provides published data on quality and performance of their product.

D. A subcontractor for any part of the work must have experience on similar work and if required, furnish Engineer with a list of projects and Owners or Engineers who are familiar with its competence.

E. Devices, equipment, structures, and systems not designated by Engineer the Contractor wishes to furnish, shall be designed by either a Registered Professional Engineer or by someone Engineer accepts as qualified. If required, complete design calculations and assumptions shall be furnished to the Engineer or Owner before acceptance.

F. Tests shall be taken by a testing laboratory operating in accordance to ASTM D 3740 or E 329 and shall be acceptable to the Engineer prior to engagement. Mill certificates of tests on materials made by manufacturers will be accepted provided the manufacturer maintains an adequate testing laboratory, makes regularly scheduled tests which are spot checked by an outside laboratory, and furnishes satisfactory certificates with name of one making the test.

G. Polyethylene pipe joining shall be performed by personnel trained in the use of butt–fusion equipment and recommended methods for new pipe connections. Personnel directly involved with installing new pipe shall receive training in the proper methods for handling and installing polyethylene pipe. Training shall be performed by a qualified representative of the pipe manufacturer.

H. Contractor shall hold the Owner and Engineer whole harmless in any legal action resulting from patent infringements.

## 1.8 PRODUCT DELIVERY, STORAGE & HANDLING

A. Material shall be unloaded in a manner avoiding damage and shall be stored where it will be protected and will not be hazardous to traffic. If stored on private property, Contractor shall obtain permission from property owner and shall repair any damage caused by the storage. Material shall be examined before installation and neither damaged nor deteriorated material shall be used in the work.

B. If new materials become damaged before or during installation, it shall be repaired as recommended by the manufacturer or replaced as required by Engineer at Contractor's expense, before proceeding further.

## 1.9 JOB CONDITIONS

A. Pipe bursting must be coordinated with other work on the site. Contractor shall replace or repair any materials or structures damaged through the course of work.

## 1.10 SEQUENCING AND SCHEDULING

A. Contractor shall arrange work so sewer lines to be replaced by pipe bursting and connecting laterals are placed back in service as soon as reasonable after the pipe is installed.

## 1.11 ALTERNATIVES

A. The intention of these specifications is to produce the best system for the Owner. If the Contractor suggests alternate material, equipment or procedures will improve results at no additional cost, Engineer and Owner will examine suggestion, and if it is accepted, it may be used. The basis upon which acceptance of an alternate will be given is its value to Owner, and not for convenience of Contractor.

## 1.12 GUARANTEE

A. Contractor shall guarantee the quality of materials, equipment, and workmanship for 12 months after acceptance of completed Project. Defects discovered during this period shall be repaired by Contractor at no cost to the Owner.

## 1.13 EXISTING UTILITIES

A. All known utility facilities are shown schematically on plans and are not necessarily accurate in location as to plan or elevation. Utilities such as service lines or unknown facilities not shown on plans will not relieve the Contractor of responsibility under this requirement. "Existing Utilities Facilities" means any utility existing on the project in its original, relocated, or newly installed position. Contractor will be held responsible for the cost of repairs to damaged underground facilities, even when such facilities are not shown on plans. Contractor shall contact all utility companies prior to beginning the work and request an accurate field location of their respective utility lines. Utility locations are scheduled by calling the Utilities Protection Center at 1–800–632–4949 or 811.

## 1.14 TESTING

A. Tests for compliance with this specification shall be made as specified herein and in accordance with the applicable ASTM Specification. A certificate shall be furnished, upon request, by the manufacturer for all material furnished under this specification. Materials may be rejected if failing to meet any requirements of this specification.

B. Testing laboratory shall operate in accordance with ASTM D 3740 and E 329 and be acceptable to the Engineer.

C. The testing laboratory and Project Engineer/Project Representative shall be given a minimum of 48 hours notice prior to taking any tests.

D. Testing shall be the responsibility of Contractor and shall be performed at Contractor's expense by a commercial testing laboratory operating in accordance with subparagraph B above.

E. Test results shall be furnished to the Engineer prior to continuing with associated or subsequent work.

## PART 2 – PRODUCTS

### 2.1 PIPE

A. Polyethylene Plastic Pipe shall be high density polyethylene pipe (HDPE) and meet the applicable requirements of ASTM F714, ASTM D3350, and ASTM D4976.

1. Sizes of insertions used shall be sufficient to renew the sewer to its original or greater flow capacity.

2. All pipe shall be made of virgin material. No rework except material obtained from manufacturer's own production of the same formulation shall be used.

3. The pipe shall be homogenous throughout and shall be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.

4. Dimension Ratios –Minimum wall thickness of polyethylene pipe shall meet the following:

| Depth of Cover (Feet) | Minimum SDR of Pipe |
|---|---|
| 0 – 16.0 | 19 |
| > 16.1 | 17 |

5. Interior of pipe shall have a light reflective color to allow easier/better viewing for video observation.

### 2.2 EQUIPMENT

A. Pipe bursting tool shall be designed and manufactured to force its way through existing pipe materials by fragmenting the pipe and compressing old pipe sections into surrounding soil as it progresses. The bursting unit shall be pneumatic and shall generate sufficient force to burst and compact existing pipe line. See manufacturer's specifications for what size tool should be used in what diameter of pipe, as well as parameters of what size tool for percentage of upsize allowed. Pipe bursting tool shall be pulled through the sewer by a winch located at upstream manhole. The bursting unit shall pull polyethylene pipe with it as it moves forward. Bursting head shall incorporate a shield/expander to prevent collapse of the hole ahead of PE pipe insertion. The pipe bursting unit shall be remotely controlled. The pipe bursting tool shall be pneumatic. Bursting action of tool shall increase external dimensions sufficiently, causing breakage of existing pipe at the same time expanding surrounding ground. This action shall not only break existing pipe but also create the void into which burster can be winched

and enables forward progress to be made. At the same time, polyethylene pipe, directly attached to sleeve on rear of burster, shall also move forward. The burster shall have its own forward momentum while being assisted by winching. A hydraulic winch shall give the burster friction by which it can be moved forward. To form a complete operating system, the burster must be matched to a constant tension hydraulic winching system.

B. Winch Unit – A winch shall be attached to the front of bursting unit. Winch shall provide a constant tension to the burster in order it may operate in an efficient manner. Winch shall ensure directional stability in keeping the unit on line. Winch shall be hydraulically operated providing a constant tension throughout the operation. Winch shall be of the constant tension type but shall be fitted with a direct reading load gauge to measure winching load. The winch must automatically maintain a constant tension at a set tonnage reading. Constant tension winch shall supply sufficient cable in one continuous length so the pull may be continuous between designated winching points. The winch, cable, and cable drum must be provided with safety cage and supports so it may be operated safely without injury to persons or property. The Contractor shall provide a system of guide pulleys and bracing at each manhole to minimize cable contact with existing sewer between manholes. Supports to trench shoring in the insertion pit shall remain completely separate from winch boom support system and shall be designed so neither pipe nor winch cable shall be in contact with them.

### 2.3 PRODUCT REVIEW

A. Contractor shall provide the Engineer with a complete description of all products before ordering. The Engineer will review all products before they are ordered by Contractor.

## PART 3 – EXECUTION

### 3.1 CONSTRUCTION OBSERVATION

A. The quality of pipe bursting shall be tested by Contractor under direction of Engineer. Engineer or Project Representative will have the right to require any portion of work be completed in their presence. However, if Contractor notifies the Engineer such work is scheduled and Engineer fails to appear within 48 hours, Contractor may proceed. All completed work and materials furnished shall be subject to review by the Engineer or Project Representative. All improper work shall be reconstructed. All materials, which do not conform to requirements of specifications, shall be removed from the work upon notice being received from Engineer for rejection of such materials. Engineer shall have the right to mark rejected materials to distinguish them as such.

Contractor shall give the Project Engineer or Project Representative a minimum of 48 hours notice for all required observations or tests.

## 3.2 CONSTRUCTION METHOD

A. Equipment used to perform the work shall be located away from buildings so not to create noise impact. Provide a silent engine compartment with the winch to reduce machine noise as required to meet local requirements.

B. It shall be the responsibility of Owner to locate and designate all access points open and accessible for work and provide rights of access to these points. If a street must be closed to traffic because of sewer orientation, Contractor shall institute actions necessary to do this for the mutually agreed time period. The Owner shall also provide free access to water hydrants for cleaning and other work items requiring water.

C. Contractor shall install all pulleys, rollers, bumpers, alignment control devices and other equipment required to protect existing manholes, and to protect the pipe from damage during installation. Lubrication may be used as recommended by the manufacturer. Under no circumstances will the pipe be stressed beyond its elastic limit. Winch line is to be centered in pipe to be burst with adjustable boom.

D. Installed pipe shall be allowed manufacturer's recommended amount of time, but not less than four hours, for cooling and relaxation due to tensile stressing prior to any reconnection of service lines, sealing of the annulus or backfilling of insertion pit. Sufficient excess length of new pipe, but not less than four inches, shall be allowed to protrude into the manhole. Restraint of pipe ends shall be achieved by means of electrofusion couplings. The electrofusion couplings shall be slipped over pipe ends against manhole wall and fused in place. Installation of electrofusion couplings shall be completed in accordance with the manufacturer's recommended procedures.

E. Following relaxation period, the annular space may be sealed. Sealing shall be made with material acceptable to Engineer and/or Project Representative and shall extend a minimum of eight inches into the manhole wall in such a manner as to form a smooth, uniform, watertight joint.

F. Pit Placement Issues

1. Window Method

Up to 12" diameter PE pipe, Contractor shall use the "windowing" method where necessary, to prevent damage to surrounding infrastructure. This method is described in T.T. Technologies, Inc.'s "Pipe Bursting Operation Manual." Both entrance and exit procedures may be conducted.

Underground utility locates must be performed prior to determining necessity and feasibility of the "windowing method."

2. Tool Retrieval through Newly Installed PE Pipe

Contractor shall use an appropriate pipe bursting system when an exit pit is difficult due to underground utility placement or surrounding infrastructure. The system shall use a pneumatic tool with a special head expander. Tool shall also have a remote controlled reverse procedure to

allow reversing the tool for removal back through newly installed pipe. In all cases, the tool must have ability to operate in reverse, preventing pipe damage during removal.

G. Observation of Pipelines – Shall be performed by experienced personnel trained in locating breaks, obstacles, and service connections by close circuit television. Interior of the pipeline shall be carefully checked to determine location of any conditions which may prevent pipe bursting, and it shall be noted so these conditions can be corrected. A video recording and suitable log shall be kept for later reference by the Owner.

H. Line Obstructions – It shall be the responsibility of Contractor to clear line of obstructions such as solids and roots preventing pipe bursting. If pre–installation observation reveals an obstruction such as a protruding service connection, dropped joint, or a collapse preventing the pipe bursting process, not evident on pre–bid video, and it cannot be removed by conventional sewer cleaning equipment, then Contractor shall make a point repair excavation to uncover and remove or repair obstruction. Such excavation shall be accepted in writing by the Owner's representative prior to commencement of work and shall be considered as a separate pay item.

I. Notification – Contractor shall make every effort to maintain service usage throughout duration of the project. In the event a sewer line or service lateral will be out of service, maximum amount of time of no service shall be 8 hours for any building or facility served by this sewer. Contractor is responsible for notifying the Owner and informing them when a sewer will be off–line.

## 3.3 PIPE JOINING

A. Polyethylene pipe shall be assembled and joined on site using the butt–fusion method to provide a leak proof joint. Threaded or solvent–cement joints and connections are not permitted.

All equipment and procedures used shall be in strict compliance with the manufacturer's recommendations. Fusing shall be accomplished by personnel certified as fusion technicians by a manufacturer of polyethylene pipe and/or fusing equipment.

B. The butt–fused joint shall have true alignment and uniform roll–back beads resulting from the use of proper temperature and pressure. The joint shall be allowed adequate cooling time before removal of pressure. Fused joint shall be watertight and shall have tensile strength equal to the pipe. All joints shall be subject to acceptance by the Engineer and/or Project Representative prior to insertion.

All defective joints shall be cut out and replaced at no cost to the Owner. Any section of pipe with a gash, blister, abrasion, nick, scar, or other deleterious fault greater in depth than 10 percent of the wall thickness, shall not be used and must be removed from job site. However, a defective area of pipe may be cut out and the joint fused in accordance with procedures stated above. In addition, any section of pipe having other defects such as concentrated ridges, discoloration, excessive spot roughness, pitting, variable wall thickness or any

other defect of manufacturing or handling as determined by the Engineer and/or Project Representative shall be discarded and not used.

C. Terminal sections of pipe joined within the insertion pit shall be connected with electrofusion couplings or connectors with tensile strength equivalent to pipe being joined.

## 3.4 SEWER SERVICE CONNECTION

A. All sewer service connections shall be identified and located prior to the pipe insertion to expedite reconnection. Upon commencement, pipe insertion shall be continuous and without interruption from one manhole to another, except as accepted by the Engineer and/or Project Representative. Upon completion of insertion of new pipe, Contractor shall expedite the reconnection of services to minimize any inconvenience to customers.

B. Sewer service connections shall be connected to the new pipe by various methods. Saddles should be made of a material compatible with the pipe. Fusion of saddle connection to the main is only means of assuring a complete leak free joint.

1. Electrofusion saddles as manufactured by Central Plastics or equivalent shall be installed in accordance with the manufacturer's recommended procedures.

2. Conventional fusion saddles as manufactured by Central Plastics, Phillips Driscopipe, Plexco, or equivalent shall be installed in accordance with the manufacturer's recommended procedures.

3. Connection of new service lateral to the mainline shall be accomplished by means of a compression–fit service connection. Service connection shall be specifically designed for connection to the sewer main being installed, and shall be INSERTA TEE, (503) 357–2110, or accepted equivalent. Install using procedures and equipment as referenced in manufacturer's written installation instructions.

## 3.5 FIELD TESTING

A. After the existing sewer is completely replaced, internally check with television camera and video recording. The finished video recording shall be continuous over entire length of sewer between two manholes.

B. Defects, which may affect integrity or strength of pipe, in the opinion of Engineer, shall be repaired or pipe replaced at Contractor's expense.

## 3.6 VIDEO OBSERVATION

A. Video observation (T.V.) of pipelines shall be performed by experienced personnel trained in locating breaks, obstacles, and service connections by closed circuit color television. Video observation shall include the following:

1. Video recordings (post) to be submitted to the Engineer and Owner before final invoice and acceptance.

2. Video recordings to remain property of the Owner; Contractor to retain second copy for its use.

3. All flows tributary to section of sewer being checked shall to be completely by–passed around the section during observation if necessary.

4. Provide post construction video recording upon completing reconstruction of each section of sewer with voice description and stationing of services. Data and stationing to be on video.

5. Should any portion of video recordings be of inadequate quality or coverage, as determined by Owner or Engineer, Contractor will have the portion re–checked and video recorded at no additional expense to Owner.

**3.7 BYPASSING SEWAGE**

A. Bypass Pumping – Contractor, when and where required, shall provide diversion for the pipe bursting/replacement process. The pumps and by–pass lines shall be of adequate capacity and size to handle all flows.

B. Contractor shall be responsible for continuity of sewer service to each facility connected to the section of sewer during execution of work.

C. If sewage backup occurs and enters buildings, the Contractor shall be responsible for clean–up, repair, property damage cost and claims.

**3.8 CLEAN–UP**

A. Upon acceptance of installation work and testing, Contractor shall restore the project area affected by operations equal to prior conditions.

**3.9 PARTIAL ACCEPTANCE OF THE WORK**

A. Owner reserves the right to accept and use any portion of work. Engineer shall have power to direct on what line Contractor shall work and the order thereof.

END OF SECTION

**INDEX TO**

**SECTION 33 05 23.13 – UTILITY HORIZONTAL DIRECTIONAL DRILLING**

# SECTION 33 05 23.13

# UTILITY HORIZONTAL DIRECTIONAL DRILLING

## PART 1 – GENERAL

### 1.1 WORK INCLUDED

A. The work under this Section is horizontal directional drilling which shall include all work, materials, labor and related necessary for the installation of a steel casing (if applicable) and high-density polyethylene (HDPE) pressure pipe, as shown on the Drawings and as specified herein. Services provided by the Contractor shall be performed in accordance with the current industry practice and these Specifications. The Contractor shall accomplish, but is not limited to, the following tasks:

1. Site preparation necessary for construction.
2. Transportation of all equipment, labor, and material to and from the project location.
3. Provide and assemble steel casing and HDPE carrier pipe.
4. Erection and dismantling of drilling equipment at the project location.
5. Drilling of a small diameter pilot hole along the alignment.
6. Reaming the pilot hole to a diameter suitable for installation of the steel casing pipe.
7. Pulling the assembled steel casing and HDPE carrier pipe through the reamed hole along with a detector wire.
8. Hydrostatic testing of the HDPE pipe.
9. Disinfection and bacteriological testing of HDPE pipe before and after installation.
10. Removal of all equipment and materials upon completion of construction.
11. Cleanup and final restoration of all work areas.

B. Related Work:

1. Work associated with providing and installing HDPE pipe is specific in Section 33 05 01.10 of these Specifications.

### 1.2 INSPECTION

The Contractor will provide and maintain instrumentation, which will accurately locate the pilot hole and measure drilling fluid flow discharge rate and pressure at all times. The Engineer will have access to these instruments and readings.

### 1.3 SUBMITTALS

Shop drawings shall be submitted, as required by the contract documents, for the following:

1. Installation Plan: At least 30 days prior to mobilizing equipment, Contractor shall submit detailed installation plan.

2. Details describing the proposed method of directional drilling. This shall include, but is not limited to, arrangement of equipment, location, and size of drilling, and receiving pits, methods of dewatering, method of removing spoils material, size and capacity of equipment, method of installing pipe, method of installing detection wire, pipe and seals, support segments, method of monitoring and controlling line and grade and provisions for protecting existing structures. Directional drilling work shall not proceed until shop drawings have been reviewed and accepted by the Engineer. If, in the opinion of the Engineer, modifications to the methods are necessary during construction, the Engineer may direct the Contractor to discontinue any directional drilling activities until proper drawings are submitted and accepted delineating such modifications.

3. Bentonite/drilling mud or other drilling fluid: product information, material specifications, handling procedures, material safety data sheet, special precautions required, and method of mixing and application. Also, submit information on the pit lining material.

4. Methods and material for joining ends of directionally drilled pipe segments.

5. A South Carolina Registered Professional Engineer other than Thomas & Hutton Engineering Co. shall design the final steel casing (if applicable) and HDPE pipe wall thickness and shall submit the stamped design calculations to the Owner (assume the area between the steel casing and the HDPE pipe contains water).

6. Manufacturer's certificate documenting the pipe and fittings has been tested and meet the specifications.

7. Equipment: Contractor will submit specifications on directional drilling equipment used to ensure the equipment will be adequate to complete the project. Equipment shall include, but not be limited to, drilling rig, mud system, mud motors (if applicable), down-hole tools, guidance system, and rig safety systems. Calibration records for guidance equipment shall be included. Specifications for any drilling fluid additives the Contractor intends to use or might use will be submitted.

8. Material: Specifications on materials used shall be submitted to Engineer. Material shall include the pipe, fitting, and any other item to be an installed component of the project.

## 1.4 QUALITY ASSURANCE

A. The work shall be accomplished by trained workers with a minimum of three years of directional drill experience. The Contractor's on-site superintendent shall have a minimum of five years experience. The Contractor shall have installed directionally drilled pipe at least as large as 12 inches in diameter and have performed crossings at least 2,000 feet in length.

B. A South Carolina Registered Professional Engineer, other than Thomas & Hutton Engineering Co., shall design the final steel casing size and thickness and HDPE pipe wall thickness and shall submit the stamped design calculations to the Owner (assuming the area between the steel casing (if applicable) and the HDPE pipe contains water).

C. Experience: Each bidder shall submit a list of experience with their bid for the directional drilling Contractor (or Subcontractor) presenting similar experience on at least five projects involving road crossings of 12 inches or greater in the Contractor's qualification form.

D. Material and equipment shall be the standard product of a manufacturer who has manufactured them for a minimum of two years and who provides published data on the quality and performance of the product.

A subcontractor for any part of the work must have experience on similar work and, if required, furnish the Engineer with a list of projects and Owners or Engineers who are familiar with its competence.

All testing of the piping shall be made by the Contractor with equipment qualified by the Owner, Engineer, or utility company and in the presence of the Engineer, Owner, and utility company. The Engineer or Project Representative reserves the right to accept or reject testing equipment.

## 1.5 PRODUCT DELIVERY, STORAGE & HANDLING

Material shall be unloaded in a manner avoiding damage and shall be stored where it will be protected and will not be hazardous to traffic. The Contractor shall repair any damage caused by the storage. Material shall be examined before installation and neither damaged nor deteriorated material shall be used in the work. Owner and Engineer have the right to reject defective or damaged material. If stored on private property, Contractor shall obtain permission from the property owner and shall repair all damage caused by the storage.

## 1.6 SEQUENCING AND SCHEDULING

The Contractor shall arrange work so sections of mains between valves are tested, sterilized, pavement replaced, and the section placed in service as soon as reasonable after it is placed. Owner reserves the right to dictate the sequence of construction.

## 1.7 ALTERNATIVES

The intention of these specifications is to define the acceptable methods and materials for installing FPVC pipe by horizontal directional drilling and to produce best system for Owner. If Contractor suggests alternative material, equipment, or procedures will improve results at no additional cost, the Engineer and Owner will examine suggestion, and if it is accepted, it may be used. The basis upon which acceptance of an alternative will be given is its value to Owner, and not for convenience of Contractor.

## 1.8 GUARANTEE

Contractor shall guarantee the quality of materials, equipment, and workmanship for a period of 18 months after final project acceptance. Defects discovered during this period shall be repaired by the Contractor at no cost to the Owner. The Contractor shall provide an 18-month guarantee.

## 1.9 EXISTING UTILITIES

All known utility facilities are shown schematically on plans, and are not necessarily accurate in location as to plan or elevation. Utilities such as service lines or unknown facilities not shown on plans will not relieve the Contractor of responsibility under this requirement. "Existing Utilities Facilities" means any utility existing on the project in its original, relocated, or newly installed position. Contractor will be held responsible for the cost of repairs to damaged underground facilities - even when such facilities are not shown on the plans. The Contractor shall contact all utility companies prior to beginning work and request an accurate field location of their respective utility lines.

## 1.10 CONNECT NEW MAIN TO EXISTING SYSTEM

Contractor shall furnish necessary pipe and perform all excavation, dewatering, shoring, backfilling, etc., necessary to make the connection of a new main to existing system to be or already installed by others. Contractor shall contact the utility a minimum of 72 hours in advance of construction. Contractor shall be responsible for coordinating construction with the utility.

## 1.11 DAMAGE TO EXISTING SYSTEM

Damage to any part of existing system by Contractor or Subcontractors, which is repaired by Utility Owner's forces, or an acceptable Contractor shall be charged to the Contractor on basis of time and material, plus an overhead and administration charge using Commission's multiplier, or plus 30% for overhead and administration for an acceptable Contractor.

## 1.12 EQUIPMENT REQUIREMENTS

A. General: Directional drilling equipment shall consist of a directional drilling rig with sufficient capacity to perform bore and pullback of pipe, a drilling fluid mixing, delivery and recovery system of sufficient capacity to successfully complete crossing, a drilling fluid recycling system to remove solids from drilling fluid so fluid can be re-used, a magnetic guidance system to accurately guide boring operations, a vacuum truck of sufficient capacity to handle drilling fluid volume, and trained and competent personnel to operate the system. All equipment shall be in good, safe operating condition with sufficient supplies, materials, and spare parts on hand to maintain system in good working order for the duration of this project.

B. Drilling System:

1. Drilling Rig: Directional drilling machine shall consist of a 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. Machine shall be anchored to the ground to withstand pulling, pushing, and rotating pressure required to complete crossing. The hydraulically-powered system shall be self-contained with sufficient pressure and volume to power drilling operations. Hydraulic system shall be free of leaks. Rig shall have a system to monitor and record maximum pull-back pressure during pull-back operations. The rig shall be grounded during drilling and pull-back operations. There shall be

a system to detect electrical current from the drill string and an audible alarm, which automatically sounds when an electrical current is detected.

2. Drill Head: The drill head shall be steerable by changing its rotation and shall provide necessary cutting surfaces and drilling fluid jets.

3. Mud Motors (if required): Mud motors shall be of adequate power to turn required drilling tools.

4. Drill Pipe: Shall be constructed of high-quality 4130 seamless tubing, Grade D or better, with threaded box and pins. Tool joints should be hardened to 32-36 RC.

C. Guidance System: A Magnetic Guidance System (MGS) probe or proven gyroscopic probe and interface shall be used to provide a continuous and accurate location of the drill head during drilling operation. The guidance shall be capable of tracking at all depths up to one hundred feet and in any soil condition, including hard rock. It shall enable driller to guide drill head by providing immediate information on the tool face, azimuth (horizontal direction), and inclination (vertical direction). Guidance system shall be accurate to +/-2% of vertical depth of the borehole at sensing position at depths up to 100 feet and accurate within 1.5 meters horizontally.

Components: Contractor shall supply all components and materials to install, operate, and maintain the guidance system. This shall include, but not be limited to the following:

Probe and Interface
Computer, Printer and Software
DC Power Source, Current Control Box, and Tracking Wire

The Guidance System shall be a proven type such as Sharewell TruTracker MGS, or other proven guidance system, and shall be set up and operated by personnel trained and experienced with this system. The Operator shall be aware of any geo-magnetic anomalies and shall consider such influences in the operation of the guidance system.

D. Drilling Fluid (Mud) System:

1. Mixing System: A self-contained, closed, drilling fluid mixing system shall be of sufficient size to mix and deliver drilling fluid composed of bentonite clay, potable water, and appropriate additives. Mixing system shall be able to "molecularly shear" individual bentonite particles from the dry powder to avoid clumping and ensure thorough mixing. The drilling fluid reservoir tank shall be a minimum of 5000* gallons. Mixing system shall continually agitate the drilling fluid during drilling operations.

2. Drilling Fluids: Drilling fluids shall be composed of clean water and bentonite clay. Water shall be from an authorized source with a pH of 8.5 – 10. Water of a lower pH or with excessive calcium shall be treated with the appropriate amount of sodium carbonate or equal. The water and bentonite clay shall be mixed thoroughly and be absent of any clumps or

clods. No additional material may be used in drilling fluid without prior acceptance from Engineer.

The bentonite mixture used shall have the minimum viscosities as measured by a March Funnel:

| | |
|---|---|
| Rock, Clay | 60 sec. |
| Hard Clay | 40 sec. |
| Soft Clay | 45 sec. |
| Sandy Clay | 90 sec. |
| Stable Sand | 80 sec. |
| Loose Sand | 110 sec. |
| Wet Sand | 110 sec. |

*dependent upon project size

These viscosities may be varied to best fit the soil conditions encountered, as accepted by the Engineer.

3. Delivery System: The mud pumping system shall have a minimum capacity of 500* GPM and be capable of delivering drilling fluid at a constant minimum pressure of 1,200 psi. The delivery system shall have filters in-line to prevent solids from being pumped into drill pipe. Connections between the pump and drill pipe shall be relatively leak-free. Used drilling fluid and drilling fluid spilled during drilling operations shall be contained and conveyed to the drilling fluid recycling system. A berm, minimum of 12 inches high, shall be maintained around drill rigs, drilling fluid mixing system, entry, and exit pits, and drilling fluid recycling system to prevent spills into the surrounding environment. Pumps and/or vacuum truck(s) of sufficient size shall be in place to convey excess drilling fluid from containment areas to storage and recycling facilities.

4. Drilling Fluid Recycling System: The drilling fluid recycling system shall separate sand, dirt and other solids from drilling fluid and render drilling fluid reusable. Spoils separated from the drilling fluid will be stockpiled for later use or disposal.

E. Other Equipment:

1. Pipe Rollers: Pipe rollers shall be of sufficient size to fully support weight of the pipe while being hydro-tested and during pull-back operations. Sufficient number of rollers shall be used to prevent excess sagging of pipe.

2. Pipe Rammers: Hydraulic or pneumatic pipe rammers may only be used if necessary and with the authorization of Engineer.

3. Restrictions: Other devices or utility placement systems for providing horizontal thrust other than those previously defined in preceding sections shall not be used unless accepted by Engineer prior to commencement of the work. Consideration for acceptance will be made on an individual basis for each specified location. Proposed device or system will be

evaluated prior to acceptance or rejection on its potential ability to complete utility placement satisfactorily without undue stoppage and to maintain line and grade within tolerances prescribed by particular conditions of the project.

*dependent upon project size

## PART 2 – PRODUCTS

### 2.1 STEEL CASING

A. The casing (if used) shall be new and unused pipe. The casing pipe shall be welded steel pipe, Schedule 30 or thicker and shall conform to ASTM A-139 and AWWA C200.

B. Pipe shall meet size and thickness required to complete the joint pull with an HDPE carrier pipe.

### 2.2 HIGH-DENSITY POLYETHYLENE (HDPE) PLASTIC PIPE

High-density polyethylene (HDPE) NSF accepted pipe shall be used. Contractor is responsible for submitting a design pipe wall thickness for the directional drill and necessary pressure rating (see Part 1.04). Contractor shall bid the appropriate pipe wall thickness and pressure rating needed. All pipe installed by directional drilling techniques shall be joined by butt fusion method. The HDPE pipe shall meet requirements of Section 33 05 01.10. The minimum SDR shall be 9 for all sizes (ASTM F-714).

## PART 3 – EXECUTION

### 3.1 GENERAL

A. Contractor shall take precautions to protect the pipe during handling and assembly. Chains, hooks, or cable slings shall not be used to handle the pipe.

B. Care shall be used to protect the pipe from scarring, gouging, or excessive abrasion.

C. If pipe is stacked, stacking height shall not exceed the manufacturer's recommendations. Manufacturer's recommendation shall be followed in unloading, storing, and protecting pipe.

D. The directional drilling procedure shall include provisions to guard against electrical shock such as ground mats, ground cables, hot boots, and gloves. In addition, the drilling equipment shall include an alarm system capable of detecting electrical current as it nears electrical lines.

E. Contractor shall confirm all necessary permits, easements, and/or right-of-ways have been secured before beginning work.

F. The directional drilling method shall have mechanical fluid assistance. Pneumatic, water jetting, or mechanical (jack and bore) methods are not acceptable.

G. Contractor may make changes to proposed vertical and horizontal alignment of the installation and location of entry and exit points, provided these changes are submitted in writing to the Engineer, and received acceptance of Engineer prior to construction.

H. Horizontal Directional Drilling operation is to be operated in a manner to eliminate the discharge or water, drilling mud and cuttings to adjacent creek or land areas involved during construction process. Contractor shall provide equipment and procedures to maximize the recirculation or reuse of drilling mud to minimize waste. All excavated pits used in the drilling operation shall be lined by Contractor with heavy-duty plastic sheeting with sealed joints to prevent migration of drilling fluids and/or ground water.

Contractor shall visit the site and must be aware of the close proximity of structures on either side of the crossing and provide Engineer with a drilling plan outlining procedures to prevent drilling fluid from adversely affecting these structures.

The general work areas on entry and exit sides of crossing shall be enclosed by a berm to contain unplanned spills or discharge.

Waste cuttings and drilling mud shall be processed through a solids control plant comprised as a minimum of sumps, pumps, tanks, desilter/desander, centrifuges, material handlers, and haulers all in a quantity sufficient to perform the cleaning/separating operation without interference with drilling program. The cuttings and excess drilling fluids shall be dewatered and dried by Contractor to extent necessary for disposal in off-site landfills. Water from dewatering process shall be treated by the Contractor to meet permit requirements and disposed of locally. The cuttings and water for disposal is subject to being sampled and tested. The construction site and adjacent areas will be checked frequently for signs of unplanned leaks or seeps.

Equipment (graders, shovels, etc.) and materials (such as groundsheets, haybales, booms, and absorbent pads) for cleanup and contingencies shall be provided in sufficient quantities by Contractor and maintained at all sites for use in the event of inadvertent leaks, seeps, or spills.

Waste drilling mud and cuttings shall be dewatered dried, and stockpiled so it can be loaded by a front-end loader, transferred to a truck, and hauled off-site to a suitable legal disposal site. The maximum allowed water content of these solids is 50% of weight.

Due to a limited storage space and environmental sensitivity at the worksites, dewatering and disposal work shall be concurrent with drilling operations. Treatment of water shall satisfy regulatory agencies before it is discharged.

I. Drill Path Survey: Entire drill path shall be accurately surveyed with entry and exit stakes placed in appropriate locations within the areas indicated on drawings. If

Contractor is using a magnetic guidance system, drill path will be surveyed for any surface geo-magnetic variations or anomalies.

J. Environmental Protection: Contractor shall 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. Additional environmental protection necessary to contain any hydraulic or drilling fluid spills shall be put in place, including berms, liners, turbidity curtains and other measures. Contractor shall adhere to all applicable environmental regulations. Fuel may not be stored in bulk containers within 200 feet of any water-body or wetland.

K. Safety: Contractor shall adhere to all applicable state, federal and local safety regulations and all operations shall be conducted in a safe manner. Safety meetings shall be conducted at least weekly with a written record of attendance and topic submitted to Engineer.

L. Pipe: Pipe shall be welded/fused together in one length, if space permits, with welds X-rayed prior to being placed in bore hole. Pipe will be placed on pipe rollers before pulling into bore hole with rollers spaced close enough to prevent excessive sagging of pipe.

## 3.2 JOINING HDPE PIPE AT ENDS OF DIRECTIONAL DRILLED SEGMENTS

A. All joints at ends of directionally drilled line shall be fusion bonded to the proposed pipe section. Mechanical couplings are not permitted. Fusion bonded joints shall provide leak free service at the specified test pressure.

B. Fusion bonding shall be accomplished as specified in Section 33 05 01.10.

## 3.3 DRILLING FLUID

A. During the drilling, reaming, or pullback operations, Contractor shall make adequate provisions for handling drilling fluids for cutting entry and exit pits. To the greatest extent practical, these fluids must not be discharged into any waterway. When the Contractor's provisions for storage of fluids or cuttings on site are exceeded, these materials shall be hauled away to a suitable legal disposal site. Contractor shall conduct directional drilling operation in such a manner that drilling fluids are not forced though the subbottom into any waterway. After completion of the directional drilling work, entry and exit pit locations shall be restored to original conditions. The Contractor shall comply with all permit provisions.

B. Pits at entry or exit point areas shall be constructed to completely contain the drill fluid and prevent its escape to any waterway or surrounding drainage system.

C. To the extent practical, Contractor shall maintain a closed loop drilling fluid system.

D. The Contractor shall minimize drilling fluid disposal quantities by utilizing a drilling fluid cleaning system, which allows returned fluids to be reused.

E. As part of the installation plan specified herein before, Contractor shall submit a drilling fluid plan which details types of drilling fluids, cleaning and recycling equipment, estimated flow rates, and procedures for minimizing drilling fluid escapes.

F. The composition of drilling fluid used shall be submitted to Engineer for acceptance prior to starting work. Fluids shall be inert and of no risk to the environment. No fluid will be accepted or utilized which does not comply with permit requirements and environmental regulations.

G. Drilling fluid shall remain in bore hole to increase stability of surrounding soil and to reduce drag on the pulled pipe.

H. Disposal of drilling fluid and all other spoils shall be the responsibility of Contractor at no additional cost to Owner and shall be conducted in compliance with all relative environmental regulations, right-of-way and work space agreements and permit requirements.

I. Drilling fluid returns at locations other then the entry and exit points shall be minimized. The Contractor shall immediately clean up any drilling fluid which inadvertently surfaces.

J. Excess drilling fluid shall be disposed of at a pre-permitted location found by Contractor. Contractor is responsible for transporting all excess fluids and other spoils to the disposal site and paying any disposal costs.

K. Drilling fluid shall not be discharged into sanitary or storm drain systems, ditches, or waterways nor allowed to enter any wetland area or creek.

## 3.4 SUBSURFACE CONDITIONS

A. Anticipated subsurface conditions at the crossing are described in soil borings attached. Borings are being provided for information only and the Owner and Engineer assume no liability for them or their interpretation.

B. Contractor must use its own experience and judgment in interpreting this data to prepare a proposal and/or perform the work.

## 3.5 EXISTING UTILITIES

A. The Contractor must exercise caution in regards to existing utilities, including:

1. Verify location of all underground utilities.
2. Exposing any utilities which are to be crossed.
3. Modify drilling practices or down hole assemblies to prevent damage to adjacent underground and above ground utilities and structures.

B. The Contractor shall provide sheeting as necessary to protect adjacent structures.

## 3.6 DRILLING WATER AND RESTORATION

A. Potable water is available at a cost to the Contractor in accordance with current utility company rate structure. Cost of transporting water to the construction site is an expense of Contractor.

B. Upon completion of pipe installation, the drilling pit and receiving pit shall be backfilled to original grade.

C. Restoration of any disturbed area shall be completed in accordance with these specifications.

## 3.7 SUB-AQUEOUS DIRECTIONAL DRILLING

A. The pipe shall be directionally drilled, as shown on plans. Equipment used to pull the pipe shall be of sufficient size for this project.

Pilot hole shall be drilled along path shown on Plan and Profile drawings to the following tolerances:

1. Vertical Location – Plus or minus 1 foot

2. Horizontal Location – Plus or minus 3 feet.

B. At the completion of pilot hole drilling, Contractor shall provide a tabulation of coordinates referenced to drilled entry point, which accurately describes location of pilot hole. This information shall be plotted on a 1"=50' scale plan with a 1"=50' horizontal and 1"=2' vertical profile scales, compatible to the drawings. This "as-built" plan and profile shall be updated as the pilot bore is advanced. Contractor shall at all times provide and maintain instrumentation that will accurately locate the pilot hole and measure drilling fluid flow and pressure. Contractor shall grant Engineer access to all data and readout pertaining to position of the bore head and fluid pressures and flows. When requested, Contractor shall provide explanations of the position monitoring and steering equipment. Contractor shall employ experienced personnel to operate directional drilling equipment and, in particular, the position monitoring and steering equipment. No information pertaining to position or inclination of pilot bores shall be withheld from the Engineer.

Each exit point shall be located as shown with an over-length tolerance of 5 feet and an alignment tolerance of 3 feet left/right with due consideration of the position of other exit points. Alignment of each pilot bore must be approved by the Engineer before pipe can be pulled. If pilot bore fails to conform to above tolerances, Engineer has the option to require a new pilot boring be made.

C. A suitable cutting head shall be used to bore the face of excavation. Overcut of the excavation shall be minimized.

D. Reaming operations shall be conducted to enlarge pilot hole have after acceptance of the pilot bore. The number and size of such reaming operations shall be conducted at discretion of the Contractor.

E. Joining Pipe

1. HDPE carrier pipe shall be joined by thermal butt fusion as specified in Section 33 05 01.10.

2. Steel casing pipe shall be welded (airtight) with a full penetration weld around the entire circumference. The weld shall not increase outside diameter by more than 3/4". Joints shall be welded in accordance with AWWA C206 and applicable American Welding Society Standards.

F. Pipe Layout and Pullback

1. Entire pipe length shall be laid out, welded, and tested in one complete unit before being pulled back through the drill hole. Line pullback shall be continuous. Pipe shall be continuously lubricated during pullback and shall be laid on rollers or other suitable apparatus to facilitate pulling the pipe.

2. If pipe or its protective coating is damaged, it shall be replaced at no cost to the Owner. If pipe is placed at an incorrect location or cannot be advanced due to an unknown obstruction, the pipe shall be abandoned in place by filling with concrete. The cost of abandoning the pipe shall be at Contractor's expense, except for pipe which has to be abandoned due to an unknown obstruction.

3. Pulling Loads: The maximum allowable pull exerted on HDPE pipelines shall be measured continuously and limited to maximum allowed by pipe manufacturer so pipe or joints are not overstressed.

4. Torsion and Stresses: A swivel shall be used to connect pipeline to drill pipe to prevent torsional stresses from occurring in the pipe.

5. Pipeline Support: The pipelines shall be adequately supported during installation to prevent overstressing or buckling.

6. Contractor shall at all time handle HDPE pipe in a manner which does not overstress the pipe. Vertical and horizontal curves shall be limited so wall stresses do not exceed 50% of yield stress for flexural bending of the HDPE pipe. If pipe is buckled or otherwise damaged, the damaged section shall be removed and replaced at Contractor's expense. Contractor shall take appropriate steps during pullback to ensure the HDPE pipe will be installed without damage.

G. Contractor shall bleed all air out of the line.

**3.8 ON-SITE OBSERVATIONS OF WORK:**

A. The Engineer or Project Representative shall have the right to require any portion of the work be completed in their presence. Any work covered up after such

instruction, shall be exposed by the Contractor for observation. However, if Contractor notifies Engineer or Project Representative such work is scheduled and they fail to appear within 72 hours, Contractor may proceed. All work completed and materials furnished shall be subject to review by the Engineer or Project Representative. All improper work shall be reconstructed. All materials, which do not conform to requirements of specifications, shall be removed from the work upon notice being received from Engineer for the rejection of such materials. Engineer shall have the right to mark rejected materials to distinguish them as such.

B. Contractor shall give Engineer or Project Representative a minimum of 72 hours notice for all required observations or tests.

C. It will also be required of Contractor to keep accurate, legible records of the location of all lines, valves, fittings, and appurtenances. These records shall be prepared in accordance with record drawing requirements of these Specifications. Final payment to the Contractor will be withheld until all such information is received and accepted. A disclaimer by the surveyor preparing As-Built drawings concerning location of underground lines will not be acceptable.

**3.9 SAFETY:**

A. Provide all necessary bracing, sheeting, bulkheads and shields to ensure complete safety to all traffic, persons, and property at all times during the work. Perform the work in such a manner as to not permanently damage existing structures or roadbeds.

B. Observe all applicable regulations of the authorities having jurisdiction over this site.

C. Perform all activities in accordance with Occupational Safety and Health Act of 1970 (PL-596), as amended, applicable regulations of Federal Government, OSHA 29 CFR 1926 and applicable criteria of ANSI A10 16-18, "Safety Requirements for the Construction of Tunnel Shafts and Caissons."

**3.10 TESTING:**

A. Prior to HDPE installation, Contractor shall hydrostatically test pipe line to determine the integrity of butt fusion joints. HDPE pipe also shall be hydrostatically tested before final acceptance after being pulled in the casing.

B. Following installation, HDPE pipe shall be hydrostatically tested and chlorinated in accordance with the specifications. See the section on HDPE Pipe for testing requirements.

**3.11 SITE RESTORATION:**

Following drilling operations, Contractor will demobilize equipment and restore the worksite to its original condition. All excavations will be backfilled and compacted to 95 percent of original density. Landscaping will be the responsibility of Contractor.

**3.12 RECORDKEEPING AND AS-BUILTS:**

Contractor shall maintain a daily project log of drilling operations and a guidance system log with a copy given to Engineer at completion of project. As-built drawings shall be completed by a professional surveyor and certified as to accuracy by Contractor.

END OF SECTION

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**SECTION 33 05 23.14 – HORIZONTAL DIRECTIONAL DRILLING (HDD)**
**INADVERTENT RELEASE CONTROL PLAN (IRCP)**

# SECTION 33 05 23.14

# HORIZONTAL DIRECTIONAL DRILLING (HDD)
# INADVERTENT RELEASE CONTROL PLAN (IRCP)

## PART 1 – GENERAL

### 1.1 DESCRIPTION

Installation of a pipeline using a trenchless excavation method is known as horizontal directional drilling (HDD). A primary environmental impact potentially associated with HDD is inadvertent release of drilling fluids/mud (water/bentonite mixture) to the surface during construction (sometimes referred to as "frac-out"). Objective of this section is to provide procedures which will minimize the potential for release of drilling fluids/mud into wetlands, waterbodies or onto adjacent surface soils.

### 1.2 SCOPE OF WORK

HDD is to be conducted in accordance with an Inadvertent Release Control Plan (IRCP). As such, HDD will be conducted in a manner to prevent inadvertent releases of drilling mud. Contractor shall have a written IRCP which shall address the "Containment, Response and Notification". This plan shall elaborate on measures to be implemented if a release occurs despite prevention efforts. The plan is to be implemented if a release occurs despite prevention efforts. The plan is to be implemented as appropriate by the Contractor under supervision of Regulatory Agencies to contain, control and clean up any release of drilling mud during HDD pipeline construction. Prior to commencement of HDD operations, Contractor shall inform construction personnel involved in HDD as to the responsible party(ies) for release containment and response. Contractor will ensure the appropriate response personnel and containment equipment are on site for each HDD. A copy of the plan shall be submitted to Owner and Engineer for review prior to any drilling taking place. A copy of the plan shall be onsite during drilling activities.

At a minimum, sediment control devices and spill control barriers (such as straw bales, silt fence or similar) shall be erected between the bore site and nearby areas such as wetlands, rivers, and critical lines to prevent material from reaching these areas. The drilling entry and exit areas will be surrounded by a barrier and/or sediment control device to control spill. These devices shall be as approved by the Regulatory Agencies. All barriers shall be installed according to the Regulatory Agency requirements.

Prior to initiating construction activities, Owner, Engineer and Contractor will review applicable permits to ensure Contractor and all personnel involved are made aware of and understands the permit and its requirements, including any special conditions of the permit, monitoring of the project required by the permit, implementation of the IRCP (frac-out) Response Plan and the implementation of Best Management Practices (BMP) during all phases of construction which are designed to prevent release of sediment or deleterious substances into adjacent wetlands or waterways. It is the responsibility of Owner to initiate this meeting. Additionally, wetland boundaries will be marked in the field and silt fencing will be established along these boundaries by Contractor prior to any other land disturbing activities on site.

## 1.3 MEASUREMENT AND PAYMENT

No separate payment will be made for preparation and/or implementation of the IRCP, including but not limited to plan preparation, observation, response, agency notifications, cleanup, containment, etc. Payment shall be incidental to cost of HDD work and considered a subsidiary obligation of the contract.

## 1.4 ON-SITE OBSERVATION DURING CONSTRUCTION

A. During construction of a directionally-drilled crossing, pipeline construction personnel will monitor pipeline route throughout the process, as follows:

1. The drill path will be continually monitored during active drilling with mud circulation;

2. Construction observers will be briefed on what to watch for and will be made aware of the importance of timely detection and response actions to any release of drilling mud;

3. Construction observers will have appropriate, operational communication equipment (e.g. radio, cell phones) available at all times during installation of the directionally drilled crossing, with ability to communicate directly with HDD operations control center;

4. If HDD operator realizes a sustained loss in fluid pressure or loss of circulation, operator will immediately notify construction observers of the assumed position of drill head and forward drilling progress will be temporarily suspended until area is reviewed;

5. Construction observers will have the authority to order installation of containment structures, if needed, and to require additional response measures if deemed appropriate;

6. Contractor shall maintain records on drilling fluid pumping rates, pressure, viscosity, density, etc. throughout the course of drilling; and

7. If drilling at night is required, appropriate lighting shall be provided.

B. Monitoring the project site during all phases of construction will be conducted by Contractor. Contractor will visually inspect the project site at least twice daily (AM and PM) for compliance with BMP's and to ensure work is proceeding as permitted and conditions are such that problems are not anticipated and an inadvertent release or frac-out has not occurred. Inspection logs will be maintained on-site and will contain the date and time of all inspections and will note any problems or potential problems or other items of interest. All actions occurring on-site causing problems with work or a temporary stop in work will be noted in the log. Daily photographs will also document progress of work, the integrity of any sediment control measures and compliance with permit conditions.

## 1.5 RESPONSE TO INADVERTENT RELEASES

A. If an inadvertent drilling mud release is observed during an HDD crossing, the release will be assessed to determine amount of drilling mud being released and potential for release to reach sensitive resource areas (e.g. wetlands and waterbodies). Response measure will vary based on location of inadvertent release as discussed below.

1. Upland Locations:

Response measures include:

a. Evaluate release to determine if containment structures are warranted and if they will effectively contain the release;

b. Order installation of containment measures as needed (see Section 1.6); and

c. Initiate immediate suspension of drilling operations if the mud release cannot be effectively contained.

2. Wetland Location:

This section also applies to areas immediately adjacent to wetlands and waterbodies, such as stream banks or steep slopes, where drilling mud releases could quickly reach surface water.

Response measures include:

a. Evaluate release to determine the most effective containment measures;

b. Order installation of containment measures (see Section 1.6);

c. Initiate immediate suspension of drilling operations if the mud release cannot be effectively contained;

d. Review and adjust drill pressures, pump volume rates, and drill profile to minimize extent of the release;

e. Further evaluate the current drill circumstances and site conditions to identify potential means to prevent further inadvertent release events; and

f. If necessary, suspend drilling operations in accordance with Section 1.6 and in consultation with the Owner and Engineer, and notify appropriate regulatory agencies in accordance with Section 1.7.

## 1.6 CONTAINMENT

A. Containment, response and clean-up equipment will be available at both sides of HDD crossing location prior to commencement of HDD to assure a timely response in the event of an inadvertent release of drilling mud (i.e. frac-out). Containment and response equipment includes but is not limited to:

1. Straw bales, sediment logs, and staking;
2. Silt fence;
3. Plastic sheeting;
4. Shovels and other appropriate hand tools;
5. Squeegees;
6. Pails;
7. Push brooms;
8. Pumps and sufficient hose;
9. Mud storage tanks;
10. Vacuum truck on 24-hour call or on site;
11. Pre-filled sandbags;
12. Geotextile fabric;
13. One small boat (for larger rivers and open water wetlands);
14. Steel box or large-diameter pipe section (or the equivalent) that, under appropriate conditions, could be used to contain a frac-out;
15. Floating containment booms;
16. Standby power; and
17. Lights for possible work at night.

B. Contractor will immediately implement measures to contain any release of sediment or other deleterious substance into adjacent wetlands or waterbodies.

Upland Locations:

1. Deploy appropriate containment measures to contain and recover drilling mud as feasible;
2. Remove excess mud at a rate sufficient to prevent an uncontrolled release;

3. If the amount of surface release is not great enough to allow practical physical collection from affected area, it shall be diluted with clean water and/or allowed to dry and dissipate naturally; and

4. If the amount of surface release exceeds that which can be completely contained with hand-placed barriers, small collection sumps (less than 5 cubic yards) may be used to remove released drilling mud by use of portable pumps and hoses.

C. Wetland and Waterbody Locations:

This section also applies to areas immediately adjacent to wetlands and waterbodies, such as pond edges, stream banks or steep slopes, where drilling mud releases could quickly reach sensitive water resource areas.

1. In the event of a drilling mud release in wetlands, waterbodies, or adjacent areas:

   a. The release will be evaluated, and appropriate containment measures will be deployed;

   b. Emergency containment measures will be deployed as feasible, based on site-specific conditions, including location of the release;

   c. Following containment, recovery measures will be evaluated to determine the most effective collection method;

   d. Drilling operations will be suspended if, as determined by Owner, containment measure do not effectively control the release; and

   e. Agency and project management personnel will be notified in accordance with Section 1.7.

2. Owner and Contractor shall immediately consult with appropriate regulatory agencies to evaluate circumstances of the release, discuss additional containment or cleanup requirements, and determine whether and under what conditions HDD may proceed (see Section 1.8);

3. If the amount of surface release is not great enough to allow practical physical collection from affected area without causing additional impacts, it shall be diluted with clean water and/or allowed to dry and dissipate naturally;

4. If the amount of surface release exceeds that which can be contained with hand-placed barriers, small collection sumps (less than 5 cubic yards) may be excavated to collect released drilling mud for removal by use of portable pumps and hoses;

5. Excess mud will be held within the containment area and removed using pumps or other appropriate measures at a rate sufficient to maintain secure containment;

6. Removed mud will be stored in a temporary holding tank or other suitable structure out of the floodplain and/or wetland for reuse or eventual disposal in an acceptable disposal facility;

7. If spill affects a vegetated area, the area shall be seeded and/or replanted similar to preconstruction conditions. Re-vegetation must be successful within the warranty period or Contractor shall replant at no additional cost to Owner.

## 1.7 NOTIFICATION AND RESUMPTION OF SUSPENDED HDD OPERATIONS

For all drilling mud releases during HDD crossings, Contractor will notify Engineer and Owner immediately. If Engineer determines the release affects wetland or in-stream area, he or she will immediately notify Owner and appropriate regulatory agencies.

If notifications are necessary during non-business hours they will be done according to prior arrangements made between the Owner and regulatory agencies. Follow-up notifications will be made as necessary and practicable.

The conditions under which HDD operations can resume will be discussed with appropriate regulatory agencies and/or field representatives. If containment measures are functioning, and circumstances and potential impacts of the release are understood, HDD operations may resume.

## 1.8 CLEAN-UP

A. Clean-up measures following mud releases in uplands, wetlands, and waterbodies will be implemented as determined by this plan and in consultation with the appropriate regulatory agencies. Contractor shall coordinate with governing regulatory agencies, Owner and Engineer to determine the appropriate method for cleaning up affected areas and appropriate methods for disposing of sediment or deleterious substances. The following measures are to be considered as appropriate:

1. Drilling mud will be cleaned up by hand shovels, buckets and soft-bristled brooms as possible without causing extensive ancillary damage to existing vegetation. Clean water washes may also be employed if deemed beneficial and feasible;

2. Containment structures will be pumped out and the ground surface scraped to bare topsoil without causing undue loss of topsoil or ancillary damage to existing and adjacent vegetation;

3. Material will be collected in containers for temporary storage prior to removal from the site; and

4. Potential for secondary impact from clean-up process is to be regularly evaluated and clean-up activities terminated if physical damage to the site is deemed to exceed benefits of removal activities in consultation with appropriate regulatory agencies and/or field representative.

5. Water containing mud, silt, bentonite or other pollutants from operations, washing or other clean-up activities, shall not be allowed to enter any waterbody, marsh or wetland area. Also all such pollutants shall be cleaned up.

## 1.9 RESTORATION AND POST-CONSTRUCTION MONITORING

Following clean-up activities, restoration and re-vegetation of affected areas will be completed by Contractor to restore the site to equal or better than its original condition. All affected areas will be fully stabilized and re-vegetated as appropriate. The site will be reviewed during warranty period to assure adequate restoration. If the site does not restore to equal or better than original conditions, subsequent re-vegetation shall be made by Contractor as part of warranty work.

## 1.10 ABANDONMENT PLAN

If for any reason, it becomes necessary to suspend HDD operations and/or abandon partially completed drill holes, the following procedures will be implemented:

A. During Pilot Hole Drilling:

If drilling is suspended during reaming of the hole;

1. If possible, reamer will be pushed back to the exit end, then:

   a. Reamer will be replaced with a cementing head; and

   b. Drill string will be withdrawn and the hole will be pumped with cement or Engineer and industry-accepted fill material to displace drilling fluid.

2. If reamer cannot be pushed back to the exit end, then:

   a. Drill string will be withdrawn and the hole will be pumped with cement or Engineer and industry-accepted fill material to displace drilling fluid;

   b. Drilling rig will rig down at the entry end and rig up at exit end;

   c. Drilling rig will run in the pilot hole with cement head on pilot hole drill string until previously cemented reamed hole is bumped; and

   d. Drill string will be withdrawn and hole pumped with cement or Engineer and industry-accepted fill material to displace the drilling fluid.

B. HDD Realignment:

If it is found necessary to abandon original location, the proposed alignment will be modified to accommodate a new drill. The proposed new exit and entry areas will be surveyed for sensitive biological and cultural resources, and agencies with regulatory control will be contacted to amend permits as needed.

In case of abandonment, an additional attempt at completing the horizontal direction drill may be made in proximity to previous route. A new hole will be drilled in the same general area as initial drill hole. No alternative crossing method will be implemented (i.e. wet trench) without the proper agency notification and permits. All work will occur at no additional cost to the Owner.

## PART 2 – PRODUCTS

Not Used.

## PART 3 – EXECUTION

### 3.1 IRCP

Contractor shall prepare a written IRCP and submit it to Owner, Engineer and regulatory agencies for concurrence. The IRCP shall be revised to include all comments from these entities and final IRCP shall remain on site. HDD Project Superintendent shall be familiar with the IRCP and shall have authority to implement it.

END OF SECTION

**INDEX TO**

**SECTION 33 30 00 – SANITARY SEWERAGE UTILITIES**

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**PART 3 – EXECUTION**

# SECTION 33 30 00

# SANITARY SEWERAGE UTILITIES

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Sewer Pipes.

B. Manholes.

C. Connect to existing system.

D. All necessary appurtenances to collect the sanitary sewerage and deliver it to the existing system.

E. Pumping Station

F. Force Main

### 1.2 RELATED SECTIONS

A. Section 31 00 00 – Earthwork.

B. Section 33 10 00 – Water Utilities.

### 1.3 OPTIONS

A. The specifications describe several materials. Where manufacturers and models of equipment are named in the specifications, it is intended these are to describe quality and function required. Contractor may use equipment or materials of other manufacturers provided they are reviewed and accepted by the Engineer and Owner as equivalent to those specified.

### 1.4 REFERENCES (Latest Revision)

A. ASTM A 139 – Electric–Fusion (Arc) Welded Steel Pipe (NPS 4 and Over).

B. ASTM A 377 – Index of Specifications for Ductile Iron Pressure Pipe.

C. ASTM A 615/A 615 M – Deformed and Plain Carbon – Steel Bars for Concrete Reinforcement.

D. ASTM A 746 – Ductile Iron Gravity Sewer Pipe.

E. ASTM C 39/C 39M – Compressive Strength of Cylindrical Concrete Specimens.

F. ASTM C 443 – Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.

G. ASTM C 478 – Precast Reinforced Concrete Manhole Sections.

H. ASTM C 890 – Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures.

I. ASTM C 891 – Installation of Underground Precast Concrete Utility Structures.

J. ASTM C 913 – Precast Concrete Water and Wastewater Structures.

K. ASTM D 714 – Evaluating Degree of Blistering of Paints.

L. ASTM D–1557 – Laboratory Compaction Characteristics of Soil Using Modified Effort.

M. ASTM D 2241 – Poly (Vinyl Chloride) (PVC) Pressure–Rated Pipe (SDR Series).

N. ASTM D 2321 – Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity–Flow Applications.

O. ASTM D 2774 – Underground Installation of Thermoplastic Pressure Piping.

P. ASTM D 2794 – Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).

Q. ASTM D 3034 – Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

R. ASTM D 3139 – Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.

S. ASTM D 3212 – Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.

T. ASTM D 3740 – Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

U. ASTM D–6938 – In–Place Density and Water Content of Soil and Soil–Aggregate by Nuclear Methods (Shallow Depth).

V. ASTM E 96 – Water Vapor Transmission of Materials.

W. ASTM E 329 – Agencies Engaged in Construction Inspection, Testing, or Special Inspection.

X. ASTM F 477 – Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

Y. ASTM F 1417 – Installation Acceptance of Plastic Non–Pressure Sewer Lines Using Low–Pressure Air.

Z. ASTM G 154 – Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for UV Exposure of Nonmetallic Materials.

AA. AWWA C 111 – Rubber–Gasket Joints for Ductile Iron Pressure Pipe and Fittings.

BB. AWWA C115 – Flanged Ductile Iron Pipe with Ductile Iron or Gray Iron Threaded Flanges.

CC. AWWA C 150 – Thickness Design of Ductile Iron Pipe.

DD. AWWA C 151 – Ductile Iron Pipe, Centrifugally Cast, for Water.

EE. AWWA C–500 – Metal–Seated Gate Valves for Water Supply Service.

FF. AWWA C–509 – Resilient–Seated Gate Valves for Water Supply Service.

GG. AWWA C 600 – Installation of Ductile Iron Water Mains and their appurtenances.

HH. AWWA C900 – Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 Inches through 12 inches, for Water Transmission and Distribution.

II. AWWA C905 – Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 Inches through 48 inches, for Water Transmission and Distribution.

JJ. ACI 318 – Building Code Requirements for Structural Concrete.

## 1.5 MEASUREMENT AND PAYMENT

A. Measurement – Items listed in the proposal shall be considered as sufficient to complete work in accordance with plans and specifications. Any portion of work not listed in the bid form shall be deemed to be a part of item it is associated with and shall be included in costs of unit shown on bid form. Payment for unit shown on the bid form shall be considered satisfactory to cover cost of all labor, material, equipment, and performance of all operations necessary to complete work in place. The unit of measurement shall be unit shown on bid form. Payment shall be based upon the actual quantity multiplied by unit prices. Where work is to be performed at a lump sum price, the lump sum shall include all operations and elements necessary to complete work.

B. Payment

1. Gravity Sewer Pipe – Measurements will be made between the centers of manholes or to other pipe ends. No deduction will be made for the space occupied by fittings. Payment will be made at the contract unit price per linear foot for each pipe size at various depths of cut. Depths of cut are measured from existing ground unless otherwise noted. Payment will include cost of pipe, plugs, dewatering, excavating all material, testing, backfilling, compaction, cleaning, metal detector tape, tracing wire, and all work necessary to complete the sewer lines.

2. Trench Wall Supports – No separate payment will be made for bracing and sheeting.

3. Manholes – Payment for manholes will be made at the unit price for various types and depths. Manhole depths are measured from invert to proposed finish grade unless otherwise noted. Payment shall include cost of excavating, dewatering, constructing manholes in accordance with

plans, furnishing and installing a frame and cover, steps, interior and exterior coatings, pipe connectors, backfilling, and compacting material around the manhole.

4. Stone Bedding – No separate payment will be made for stone bedding.

5. Sand Bedding – Will be measured by using the length and depth for which sand is specified by Engineer or Geotechnical Consultant, times a width of four feet wider than outside barrel of pipe. Payment will include excavating the unsuitable material below the invert, furnishing, and compacting the sand bedding.

6. Service Connection – Payment will be made at the contract unit price. Payment shall include the fitting, plug, and marking stake.

7. Metal Detector Tape – No separate payment will be made for tape. Cost of furnishing and placing metal detector tape shall be included in the contract unit price for installing sewer and force main pipe.

8. Tracer Wire – No separate payment will be made for wire. The cost of furnishing and placing tracer wire shall be included in the contract unit price for installing sanitary sewer, and service laterals.

9. Laterals – Shall be measured from center of main to the point where lateral reaches property line. Payment will include furnishing the pipe, excavation, installation, metal detector tape, tracing wire, backfilling, compaction, and all work and materials necessary to complete laterals.

10. Grassing – There will be no separate measurement or payment. Grassing shall be a subsidiary obligation of Contractor in the restoration of disturbed areas.

11. Remove and Replace Existing Pavement – Payment will be made on a square yard basis, and in accordance with the detail shown.

12. Connect Sewers to Existing Structures – Payment will be made at the contract unit price for each pipe size connected. For precast structures payment shall include cost of dewatering, excavation, coring, furnishing and installing flexible sleeve, installing and connecting pipe to sleeve, backfilling, compaction, clean–up, and all work necessary to complete the connection. For brick structures, payment shall include cost of dewatering, excavation, cutting a hole, installing and grouting in pipe, backfilling, compaction, cleanup, and all work necessary to complete the connection.

## 1.6 QUALITY ASSURANCE

A. Contractor will furnish the Engineer and Owner a description of <u>all</u> material before ordering. Engineer will review the Contractor's submittals and provide in writing an acceptance or rejection of material.

B. Where ductile iron pipe is indicated on the plans, or required by Engineer, it shall be used.

C. Material and equipment shall be the standard products of a manufacturer who has manufactured them for a minimum of two years and provides published data on their quality and performance.

D. A subcontractor for any part of the work must have experience on similar work, and if required, furnish Engineer with a list of projects and Owners or Engineers who are familiar with its competence.

E. If Contractor wishes to furnish devices, equipment, structures, and systems not designed by Engineer, these items shall be designed by either a Professional Engineer registered in the project state or by someone Engineer accepts as qualified. If required, complete design calculations and assumptions shall be furnished to the Engineer or Owner before acceptance.

F. Testing shall be by a testing laboratory which operates in accordance to ASTM D 3740 or E 329 and shall be acceptable to Engineer prior to engagement. Mill certificates of tests on materials made by manufacturers will be accepted provided the manufacturer maintains an adequate testing laboratory, makes regularly scheduled tests, spot checked by an outside laboratory, and furnishes satisfactory certificates with name of entity making test.

G. Infiltration, line and grade of sewer, pump performance, and hydrostatic tests on force mains shall be made by Contractor with equipment qualified by Engineer and in the presence of Engineer. Engineer or Project Representative reserves the right to accept or reject testing equipment.

## 1.7 PRODUCT DELIVERY, STORAGE & HANDLING

A. Material shall be unloaded in a manner avoiding damage and shall be stored where it will be protected and will not be hazardous to traffic. If stored on private property, Contractor shall obtain permission from property owner and shall repair any damage caused by the storage. Material shall be examined before installation. Neither damaged nor deteriorated material shall be used in the work.

## 1.8 JOB CONDITIONS

A. Installation of sanitary sewerage utilities must be coordinated with other work on the site. Generally, sanitary sewer pipes will be installed first and shall be backfilled and protected so subsequent excavating and backfilling of other utilities does not disturb them. Contractor shall replace or repair any damaged pipe or structure at no additional expense to the Owner.

## 1.9 SEQUENCING AND SCHEDULING

A. Contractor shall arrange the work so sections of sewers between manholes are backfilled and tested, lateral sewers connected, pavement replaced, and placed in service as soon as reasonable after installation.

## 1.10 ALTERNATIVES

A. The intention of these specifications is to produce the best system for the Owner. If the Contractor suggests alternate material, equipment or procedures will improve results at no additional cost, Engineer and Owner will examine suggestion, and if accepted, it may be used. The basis upon which acceptance of an alternate will be given is its value to Owner, and not for Contractor's convenience.

## 1.11 GUARANTEE

A. Contractor shall guarantee quality of materials, equipment, and workmanship for 12 months after acceptance of the completed Project. Defects discovered during this period shall be repaired by Contractor at no cost to the Owner.

## 1.12 EXISTING UTILITIES

A. All known utility facilities are shown schematically on the construction drawings and are not necessarily accurate in location as to plan or elevation. Utilities such as service lines or unknown facilities not shown will not relieve the Contractor of responsibility under this requirement. "Existing Utilities Facilities" means any utility existing on the project in its original, relocated, or newly installed position. Contractor will be held responsible for cost of repairs to damaged underground facilities, even when such facilities are not shown on the drawings.

B. The Contractor shall call for underground utility locations before starting work. Underground utilities location service can be contacted at 1–888–721–7877 (SC) or 811.

## 1.13 TESTING

A. Laboratory tests for moisture density relationship for fill materials shall be in accordance with ASTM D 1557, (Modified Proctor).

B. In place density tests in accordance with ASTM D 6938.

C. Testing laboratory shall operate in accordance with ASTM D 3740 and E 329 and be acceptable to the Engineer.

D. Testing laboratory and Project Engineer/Project Representative shall be given a minimum of 48–hours notice prior to taking any tests.

E. Testing shall be Contractor's responsibility and shall be performed at the Contractor's expense by a commercial testing laboratory operating in accordance with subparagraph C above.

F. Test results shall be furnished to the Engineer prior to continuing with associated or subsequent work.

## PART 2 – PRODUCTS

Materials used in the work shall be those named in Bid Form. In multiple type bids, selection of material types will be at the opinion of Owner. Materials and products used in work shall conform to one of the following:

### 2.1 SEWER PIPE

A. PVC Pipe – Shall be polyvinyl chloride plastic (PVC) and shall meet all requirements of ASTM D 3034 SDR 26, except for depths less than 3 feet where ductile iron pipe must be installed. All pipe shall be suitable for use as a gravity sewer conduit. Provisions must be made for contraction and expansion at each joint with a rubber gasket. Pipe sizes and dimensions shall be as shown below. All pipe shall be green or white in color with factory marked homing lines. Fittings shall meet the same specification requirements as pipe.

| Nom. Size | Outside Diameter | | Min. Wall Thickness SDR–26 |
|---|---|---|---|
| | Average | Tolerance | |
| 4 | 4.215 | ± 0.009 | .162 |
| 6 | 6.275 | ± 0.011 | .241 |
| 8 | 8.400 | ± 0.012 | .323 |
| 10 | 10.500 | ± 0.015 | .404 |
| 12 | 12.500 | ± 0.018 | .481 |

Tests on PVC Pipe – Pipe shall be designed to pass all tests at 73 ° F. (± 3° F.).

B. Ductile Iron – Shall conform to AWWA C 150, AWWA C 151 and ASTM A 746. All pipe shall be Pressure Class 350 unless otherwise noted. All ductile iron pipes and fittings shall be bituminous coated on the outside and lined with Protecto 401 Ceramic Epoxy or equivalent on inside.

1. Coating on the outside shall be an asphaltic coating approximately 1 mil thick. Finished coating shall be continuous, smooth, neither brittle when cold or sticky when exposed to sun and shall be strongly adherent to the iron.

2. Protecto 401 Ceramic Epoxy or equivalent interior lining shall conform to ASTM E 96, ASTM D 714, ASTM D 2794 and ASTM G 53. Interior of the pipe shall receive 40 mils nominal dry film thickness of epoxy. Lining application, inspection, certification, handling, and surface preparation of area to receive the protective coating shall be in accordance with manufacturer's specifications and requirements.

### 2.2 JOINTS – GRAVITY SYSTEM

A. Joints for Ductile Iron Pipe – Shall be slip–on rubber equivalent to "Fastite," "All–tite," or "Tyton."

B. Joints for PVC Pipe – Shall be integral wall bell and spigot with a rubber ring gasket. Joints shall conform to ASTM D 3212 and gaskets to ASTM F 477.

## 2.3 CASING

A. Casing pipe shall be steel conforming to ASTM A 139, yield point of 35,000 p.s.i., of the diameter shown on drawings at each crossing. The minimum wall thickness shall be 0.25 inches.

## 2.4 CASING SPACERS

A. Casing spacers shall be bolt on style with a shell made in two sections of a minimum 14 gauge T–304 Stainless Steel. Connecting flanges shall be ribbed for extra strength. The shell shall be lined with a PVC liner. All nuts and bolts shall be T–304 Stainless Steel. Runners shall be made of Ultra High Molecular Weight Polymer with inherently high abrasion resistance and a low coefficient of friction. The combined height of supports and runners shall keep carrier pipe a minimum of 0.75–inches from casing pipe at all times. Casing Spacers shall be as manufactured by Cascade Waterworks Manufacturing Company or accepted equivalent.

## 2.5 MANHOLES

A. Masonry – Shall be new whole brick of good quality laid in masonry mortar or cement mortar made of one part Portland cement and two parts clean sharp sand. Every brick shall be fully bedded in mortar. Manholes shall conform to locations and details shown on the plans.

B. Precast Concrete – Shall be reinforced concrete constructed in accordance with ASTM C 478 and details shown on the plans "Precast Concrete Manholes." Coarse aggregate shall be granite stone. The joints shall be tongue and groove sealed with flexible gaskets or mastic sealant. Gaskets shall be O–Ring or equivalent to Type A or B "Tylox" conforming to ASTM C 443. Mastic shall be equivalent to "Ram–nek" with primer. Primer shall be applied to all contact surfaces of manhole joint at the factory in accordance with manufacturer's instructions.

C. Frames and Covers – Shall be cast iron equivalent to the following:

Neenah Foundry Co. R–1668 Type "C" Lid or Equal

D. Manhole Steps – Shall be equivalent to M.A. Industries, Type PS–1 or PS–2–PF. Steps shall be installed at the manhole factory and in accordance with recommendations of step manufacturer. Manholes will <u>not</u> be acceptable if steps are not installed accordingly.

E. Pipe Connections – Shall have flexible watertight joints at sewer main point of entry into the manhole. The joint shall be an EPDM or polyisoprene sleeve equivalent to "Kor–N–Seal."

F. Coatings – New manholes shall have all interior surfaces coated with a factory applied acrylic polymer–base coating and sealant. The coating shall be ConSeal CS–55 manufactured by Concrete Sealants, New Carlisle, Ohio or an accepted equivalent. The coating shall be applied in three coats to achieve a total dry film

thickness of at least 3.5 mils in accordance with manufacturer's recommendations. Surfaces shall be cleaned of all dust, form oils, curing compounds and other foreign matter prior to the coating application.

New or existing manholes requiring a force main tie–in and the next downstream manhole shall be coated with 125 wet film mils of Raven 405 ultra high build epoxy or an accepted equivalent. The interior surfaces shall be cleaned and prepared according to manufacturer's recommendations.

**2.6 TEES AND WYES**

A. Gravity sewer tees shall be four or six inches and same diameter as the run of pipe. They shall be of same material as the sewer main.

B. Wyes for cleanouts shall be of same material as the lateral pipe.

**2.7 LATERALS AND CLEANOUTS**

A. Shall be Ductile Iron Pipe conforming to paragraph 2.1–B, with push–on joints or Polyvinyl Chloride pipe with bells and rubber gaskets for jointing, conforming, to Paragraph 2.1–A, PVC Pipe.

B. Cleanout Access Box shall be equivalent to U.S. Foundry USF 7623 in pavement or Genova Products 4-inch Schedule 40 PVC-DWV cleanout fitting with threaded plug out of pavement.

**2.8 STONE BACKFILL**

A. Shall be graded crushed granite with the following gradation:

| Square Opening Size | Percent Passing |
|---|---|
| 1 inch | 100% |
| 3/4 inch | 90 to 100% |
| 3/8 inch | 0 to 65% |
| No. 4 | 0 to 25% |

**2.9 SAND BACKFILL**

A. Shall be clean sand free from clay and organic material. Not more than 10% shall pass the No. 100 sieve.

**2.10 BORROW**

A. Where it is determined sufficient suitable material is not available from the site to satisfactorily backfill pipe to at least two feet above top of pipe, Contractor shall furnish suitable sandy borrow material to accomplish requirements. Material shall not have more than 60% passing the No. 100 sieve, nor more than 20% passing a No. 200 sieve.

### 2.11 AIR RELEASE VALVE

A. Shall be designed for sewage service. The valve shall be constructed of a cast iron body, stainless steel or bronze trim, and stainless steel float. The inlet shall be 2 inches, 5/16 inch orifice, and a venting capacity of 35 c.f.f.a.m. The working pressure shall be 0 to 50 p.s.i. It shall conform to detail shown on the drawings.

### 2.12 METAL DETECTOR TAPE

A. Will be installed above all pipe. Tape shall consist of 0.35 mils thick solid foil core encased in a protective plastic jacket resistant to alkalis, acids, and other destructive elements found in the soil. The lamination bond shall be strong enough so layers cannot be separated by hand. Total composite thickness shall be 5.0 mils. Foil core to be visible from unprinted side to ensure continuity. The tape shall have a minimum 3 inch width and a tensile strength of 35 lbs. per inch.

A continuous warning message indicating "sewer line" repeated every 16 inches to 36 inches shall be imprinted on the tape surface. Tape shall contain an opaque color concentrate designating color code appropriate to the line being buried (Sewer Line – Green).

### 2.13 TRACER WIRE

A. Will be used over all sanitary sewer. Tracer wire shall be #12 AWG High–Strength Copper Clad Steel (HS–CCS) Conductor, insulated with 30 mil High Density Polyethylene (HDPE) Insulation, and rated for direct burial. Insulation color shall meet APWA color code standards for identification of buried utilities.

B. Wire connectors shall be designed for direct burial and moisture resistance. Connectors shall be equivalent to 3M DBR/Y–6 Direct Bury Splice Kit.

## PART 3 – EXECUTION

### 3.1 CONSTRUCTION OBSERVATION

A. The line, grade, deflection, and infiltration of sewers shall be tested by Contractor under the direction of Engineer. Engineer or Project Representative will have the right to require any portion of work be completed in their presence. If work is covered up after such instruction, it shall be exposed by Contractor for observation. However, if Contractor notifies Engineer such work is scheduled and Engineer fails to appear within 48 hours, the Contractor may proceed. All work completed and materials furnished shall be subject to review by the Engineer or Project Representative. All improper work shall be reconstructed. All materials not conforming to requirements of specifications shall be removed from the work upon notice being received from Engineer for rejection of such materials. Engineer shall have the right to mark rejected materials to distinguish them as such.

Contractor shall give the Project Engineer or Project Representative a minimum of 48 hours notice for all required observations or tests.

It will also be required by Contractor to keep accurate, legible records of the location of all sanitary lines, service laterals, manholes, force mains, valves, bends, and appurtenances. These records will be prepared in accordance with "Record Data and Drawings" paragraph in the Special Conditions. Final payment to the Contractor will be withheld until all such information is received and accepted.

## 3.2 LOCATION AND GRADE

A. Line and grade of sewers and position of all manholes and other structures are shown on the drawings. Grade line as given on the profile or mentioned in these specifications means invert or inside bottom of pipe and price for trenching shall include trench for depth below this line necessary to lay sewer to this grade, but measurements for payment will be made only to grade line. Master control lines and bench marks have been provided by the Engineer. The Contractor shall be responsible for proper locations and grades of sewers.

## 3.3 SEWER EXCAVATION

A. Contractor shall perform all excavations of every description and of whatever substance encountered to the depth shown on the plans or specified for all sewers, manholes, and other appurtenances. All excavations shall be properly dewatered before installations are made, by the use of well points, pumping, or other methods accepted by Engineer. Trenches shall be excavated in conformance with the Occupational and Safety Health Administration's (OSHA) Regulations.

Where the character of soil is unsuitable for pipe bedding as determined by Engineer or Geotechnical Consultant, additional excavation will be authorized. Engineer or Geotechnical Consultant shall determine the depth needed for additional bedding and whether material will be sand or stone. The unsuitable material shall be disposed of at Contractor's expense in a proper manner. Bottom of all trenches shall be rounded to conform to bottom of pipe, to afford full bearing on pipe barrel. Excavation in excess of depths and widths required for sewers, manholes, and other structures shall be corrected by pouring subfoundations of 3,000 p.s.i. concrete and half cradle at the Contractor's expense.

B. Trenches shall not be excavated more than 400 feet in advance of pipe laying.

## 3.4 TRENCH WALL SUPPORT

A. Bracing and Sheeting – The sides of all trenches shall be securely held by stay bracing, or by skeleton or solid sheeting and bracing, as required by soil conditions encountered, to protect adjoining property and for safety. Where shown on drawings or where directed by Engineer, the Contractor must install solid sheeting to protect adjacent property and utilities. Sheeting shall be steel or timber and Contractor shall submit design data, including the section modulus of members and arrangement for bracing at various depths, to Engineer for review before installing sheeting. It shall penetrate at least 3–feet below the pipe invert. Contractor shall ensure support of pipe and its embedment is maintained throughout installation and ensure sheeting is sufficiently tight to prevent washing out of the trench wall from behind sheeting.

B. Sheeting Removal – Sheeting shall be removed in units and only when backfilling elevation has reached the level necessary to protect pipe, adjoining property, personnel, and utilities. Removal of sheeting or shoring shall be accomplished in a manner to preclude loss of foundation support and embedment materials. Fill voids left on removal of sheeting or shoring and compact all materials to required densities.

C. Movable Trench Wall Supports – Do not disturb installed pipe and its embedment when using movable trench boxes and shields. Movable supports should not be used below top of pipe zone unless acceptable methods are used for maintaining the integrity of embedment material. Before moving supports, place and compact embedment to sufficient depths to ensure protection of the pipe. As supports are moved, finish placing and compacting embedment.

D. When sheeting or shoring cannot be safely removed, it shall be left in place. Sheeting left in place shall be cut off at least 2 feet below the surface. No separate payment shall be made for bracing and sheeting except where shown on drawings or authorized by the Engineer.

**3.5 LAYING PIPE**

A. All sewer pipe shall be laid upgrade with spigots pointing downgrade and in accordance with ASTM D 2321. The pipe shall be laid in a ditch prepared in accordance with Paragraph 3.3 "Sewer Excavation." When sewer is complete, the interior surface shall conform on bottom accurately to grades and alignment fixed or given by Engineer. Special care shall be taken to provide a firm bedding in good material, select borrow, stone backfill or 3,000 p.s.i. concrete, as authorized, for length of each joint and 1/2 of the circumference. Holes shall be provided to relieve bells from bedding strain, but not so large to allow separation of the bell from barrel by settlement after backfilling. All pipe shall be cleaned out and left clean. Every third joint shall be filled around immediately after being properly placed.

B. Jointing – Comply with manufacturer's recommendations for assembly of joint components, lubrication, and making joints. When pipe laying is interrupted, secure piping against movement and seal open ends to prevent the entrance of water, mud, or foreign material.

C. Placing and Compacting Pipe Embedment – Place embedment materials by methods which will not disturb or damage the pipe. Work in and tamp haunching material in area between the bedding and underside of pipe before placing and compacting remainder of embedment in pipe zone. Do not permit compaction equipment to contact and damage the pipe. Use compaction equipment and techniques compatible with materials used and location in the trench. Before using heavy compaction or construction equipment directly over the pipe, place sufficient backfill to prevent damage, excessive deflections, or other disturbance of the pipe.

D. Rock or Unyielding Materials in Trench Bottom – If ledge rock, hard pan, shale, or other unyielding material, cobbles, rubble, debris, boulders, or stones larger than

1.5–inches are encountered in the trench bottom, excavate a minimum depth of 6–inches below pipe bottom and replace with proper embedment material.

E. Vertical Risers – Provide support for vertical risers as commonly found at service connections, cleanouts, and drop manholes to preclude vertical or lateral movement. Prevent the direct transfer of thrust due to surface loads and settlement and ensure adequate support at points of connection to main lines.

F. Exposing Pipe for Making Service Line Connections – When excavating for a service line connection, excavate material from above the top of main line before removing material from sides of pipe. Materials and density of service line embedment shall conform to specifications for the main line.

G. Manhole Connections – Use flexible water stops, resilient connectors, or other flexible systems acceptable to the Engineer making watertight connections to manholes and other structures. Fill annular space between pipe and precast concrete on inside of manhole with non-shrink grout.

## 3.6 SEPARATION BETWEEN WATER & SANITARY SEWER

A. Parallel Installation:

1. Water mains shall be laid at least 10 feet horizontally from any existing or proposed sanitary sewer, storm sewer, or sewer manhole. The distance shall be measured edge–to–edge.

2. When conditions prevent a horizontal separation of 10 feet, water main may be laid closer to a sewer (on a case–by–case basis) provided water main is laid in a separate trench or on an undisturbed earth shelf located on one side of the sewer at such an elevation where bottom of water main is at least 18 inches above top of sewer. It is advised the sewer be constructed of materials and with joints equivalent to water main standards of construction and be pressure tested to assure water–tightness prior to backfilling.

B. Crossing:

1. Water mains crossing house sewers, storm sewers, or sanitary sewers shall be laid to provide a separation of at least 18 inches between the bottom of water main and top of sewer. At crossings, one full length of water pipe shall be located so both joints will be as far from the sewer as possible. Special structural support for the water and sewer pipes may be required.

2. When conditions prevent a vertical separation of 18 inches, the sewer passing over or under water mains shall be constructed of materials and with joints equivalent to water main standards of construction and shall be pressure tested to assure water–tightness prior to backfilling.

3. When water mains cross under sewers, additional measures shall be taken by providing:

a. a vertical separation of at least 18 inches between bottom of the sewer and top of water main;

b. adequate structural support for sewers to prevent excessive deflection of joints settling on and breaking the water mains;

c. length of water pipe be centered at the point of crossing so joints will be equidistant and as far as possible from sewer; and

d. both sewer and water main shall be constructed of water pipe and subjected to hydrostatic tests, as prescribed in this document. Encasement of the water pipe in concrete shall also be considered.

e. crossings shall conform to South Carolina Department of Health and Environmental Control's Bureau of Water Standards for Wastewater Facility Construction: Regulation 61–67.

## 3.7 BACKFILLING

A. All trenches and excavation shall be backfilled immediately after pipes are laid therein, unless other protection of the pipe line is directed. Backfilling material shall be selected and deposited with special reference to the future safety of pipes. Except where special methods of bedding and tamping are provided for, clean earth or sand shall be solidly tamped about pipe up to a level at least 2 feet above top of pipes, and shall be carefully deposited to uniform layers, each layer solidly tamped or rammed with proper tools to not injure or disturb the pipeline. Remainder of the trench backfilling shall be carried on simultaneously on both sides of pipe in such a manner preventing injurious side pressure. The material used shall be selected from excavated material anywhere on site if any of this material is suitable. Backfill material shall be clean and free of rock, organic and other deleterious matter.

Under traffic areas, the top 24 inches of backfill material shall be compacted to a density of not less than 98% of maximum laboratory density at optimum moisture. Below the 24-inch line and to and including area around pipe, density shall not be less than 95% of maximum laboratory density at optimum moisture. In non–traffic areas, the backfill material shall be compacted to a density of not less than 90% of maximum laboratory density at optimum moisture unless otherwise accepted by Engineer. Compaction tests shall be conducted in accordance with ASTM D 6938 by an independent testing laboratory. Tests are to be taken at the direction of Engineer.

Whenever trenches have not been properly backfilled, or if settlement occurs, they shall be refilled, smoothed off and finally made to conform to the ground surface. Backfilling shall be carefully performed, and original surface restored to the full satisfaction of Engineer immediately after installation.

Where thermoplastic (PVC) pipe is installed, Contractor shall take precautions in accordance with ASTM D 2321, during backfilling operations so not to create excessive side pressures, or vertical or horizontal deflection of the pipe nor impair flow capacity.

## 3.8 MANHOLES

A. Manholes shall be constructed where shown on the drawings or where directed by Engineer. The channel in bottom of manholes shall be smooth and properly rounded. Special care must be exercised in laying the channel and adjacent pipes to grade. Manhole top elevations shall be greater than or equal to the 50 year flood elevation, unless watertight covers are provided. Tops of manholes outside of roads shall be built to grades 1–inch above ground surface in developed areas and 6 inches above ground surface in undeveloped areas unless otherwise shown on the plans. Manholes in roads shall be built to grades designated by the Engineer. Manhole sections with either honeycomb defects; exposed reinforcing; broken/fractured tongue or groove; or cracked walls will be subject to rejection by Engineer for use on the project. When mastic sealant is used, improperly applied primer will also be cause for rejection.

No leaks in any manhole will be acceptable. All repairs made from inside the manhole shall be made with mortar composed of one part Portland cement and two parts clean sand. The mixing liquid shall be straight bonding agent equivalent to "Acryl 60."

## 3.9 STONE BEDDING

A. Where, in the Engineer's or Geotechnical Consultant's opinion, subgrade of pipe trench is unsuitable material, Contractor shall remove unsuitable material to a depth determined by Engineer or Geotechnical Consultant and furnish and place stone backfill in trench to stabilize subgrade. Presence of water does not necessarily mean stone backfill is required. If well points or other types of dewatering will remove the water, Contractor shall be required to completely dewater trench in lieu of stone backfill. Stone bedding will be limited to areas where well pointing and other conventional methods of dewatering will not produce a dry bottom. Stone shall be placed 4 feet wider than the outside diameter of pipe. The pipe shall be carefully bedded in stone as specified, or in accordance with manufacturer's recommendations.

## 3.10 SAND BEDDING

A. Where, in the Engineer's or Geotechnical Consultant's opinion, character of soil is unsuitable for pipe bedding, even though dewatered, additional depth of excavation as determined by Engineer or Geotechnical Consultant shall be made and replaced with clean sand furnished by Contractor.

## 3.11 DEFLECTION

A. It is the Contractor's responsibility to assure backfill is sufficient to limit pipe deflection to no more than 5%. When flexible pipe is used, a deflection test shall be made by Contractor on the entire length of installed pipeline, not less than 30–days after completion of all backfill and placement of any fill. Deflection shall be determined by use of a deflection device or by use of a spherical, spheroidal, or elliptical ball, a cylinder, or circular sections fused to a common shaft. Ball, cylinder, or circular sections shall have a diameter, or minor diameter as applicable, of 95% of the inside pipe diameter. The ball, cylinder, or circular

sections shall be of a homogeneous material throughout, shall have a density greater than 1.0 as related to water at 39.2 degrees F, and shall have a surface brinell hardness of not less than 150. The device shall be center bored and through bolted with a 1/4-inch minimum diameter steel shaft having a yield strength of 70,000 p.s.i. or more, with eyes at each end for attaching pulling cables. The eye shall be suitably backed with flange or heavy washer; a pull exerted on opposite end of shaft shall produce compression throughout remote end of ball, cylinder, or circular section. Circular sections shall be spaced so distance from the external faces of front and back sections shall equal or exceed diameter of circular section. Failure of the ball, cylinder, or circular section to pass freely through a pipe run, either by being pulled through by hand or by being flushed through with water, shall be cause for rejection of individual run. When a deflection device is used for the test in lieu of a ball, cylinder, or circular sections described, such device shall be acceptable to Engineer prior to use. Device shall be sensitive to 1.0% of diameter of pipe being measured and shall be accurate to 1.0% of indicated dimension. Installed pipe showing deflections greater than 5% of the normal diameter of pipe shall be retested by a run from opposite direction. If retest also fails, the suspect pipe shall be repaired or replaced at no cost to Owner.

## 3.12 LEAKAGE

A. In no stretch of sewer between any two adjoining manholes shall infiltration/exfiltration exceed 25 gallons/day/inch of pipe diameter per mile of pipe. In case leakage exceeds this amount, the sewer shall not be accepted until such repairs and replacements are made to comply with above requirements. Such corrections will be made at the Contractor's expense. All visible leaks shall be repaired, regardless of the amount of leakage.

B. Lines shall be tested for leakage by low pressure air testing, infiltration tests, or exfiltration tests, as appropriate. Low pressure air testing for PVC pipe shall be as prescribed in ASTM F 1417. Prior to infiltration or exfiltration tests, trench shall be backfilled up to at least the lower half of pipe. If required, sufficient additional backfill shall be placed to prevent pipe movement during testing, leaving the joints uncovered to permit inspection. Visible leaks encountered shall be corrected regardless of leakage test results. When water table is 2 feet or more above top of pipe at upper end of pipeline section to be tested, infiltration shall be measured using a suitable weir or other device acceptable to Engineer. When Engineer determines infiltration cannot be properly tested, an exfiltration test shall be made by filling the line to be tested with water so a head of at least 2 feet is provided above both water table and top of pipe at upper end of pipeline to be tested. The filled line shall be allowed to stand until pipe has reached its maximum absorption, but not less than 4 hours. After absorption, the head shall be re–established. The amount of water required to maintain this water level during a 2-hour test period shall be measured. Leakage as measured by either the infiltration test or exfiltration test shall not exceed 25 gallons per inch diameter per mile of pipeline per day. When leakage exceeds the maximum amount specified, satisfactory correction shall be made and retesting accomplished. Testing, correction, and retesting shall be made at no additional cost to the Owner.

C. The Contractor shall furnish equipment and plugs and subject force mains to hydrostatic tests at 100 p.s.i. for a period of 2 hours. Any leaks shall be located and repaired. Each section tested shall be slowly filled with water, care being taken to expel all air from the pipes. No pipe installation will be accepted until leakage during pressure test is less than the number of gallons listed for each 1000–feet of pipe tested:

| | |
|---|---|
| 6 inches & less – 0.9 gallons | 12 inches – 1.80 gallons |
| 8 inches – 1.20 gallons | 14 inches – 2.10 gallons |
| 10 inches – 1.50 gallons | 16 inches – 2.40 gallons |

**3.13 CLEANING AND ACCEPTANCE**

A. Before acceptance of sewer system, it shall be tested and cleaned to the satisfaction of Engineer. Where any obstruction is met, Contractor will be required to clean sewers by means of rod and swabs or other instruments. The pipeline shall be straight and show a uniform grade between manholes. The Engineer shall check lines by lamping or other methods to determine final acceptance.

**3.14 CLOSING PIPE**

A. When work or pipe installation is suspended, either for the night or at other times, end of sewer must be closed with a tight cover. Contractor will be held responsible for keeping the sewer free from obstruction.

**3.15 PARTIAL ACCEPTANCE OF THE WORK**

A. Owner reserves right to accept and use any part of the work. Engineer shall have power to direct on what line the Contractor shall work and order thereof.

**3.16 GRASSING**

A. Grassing of areas disturbed during construction shall be in accordance with Section 32 92 00 – "Turf and Grasses."

**3.17 RECORD DATA**

A. It will be required of the Contractor to keep accurate, legible records, locating all sewers, force mains, tees, and laterals. These records will be made available to Engineer before final review for incorporation into the Engineer's Record Drawings. Final payment to the Contractor will be withheld until all such information is received and accepted.

**3.18 REMOVE AND REPLACE PAVEMENT**

A. Pavement shall only be removed after prior written authorization by the Owner. Pavement removed and replaced shall be constructed in accordance with latest specifications of the State Department of Transportation. Traffic shall be maintained and controlled per State Department of Transportation regulations.

Edges of the pavement shall be cut to a neat straight line with a masonry saw. Backfill shall be compacted and tested and a concrete base course of 5,000 p.s.i. placed on the fill as shown on details. The concrete base shall be placed within 24 hours after pipeline is installed. A temporary wearing surface may be used provided it presents a smooth surface. The final wearing surface shall be 2 inches asphaltic concrete.

**3.19 METALLIC DETECTOR TAPE**

A. Contractor shall place metallic detector tape, suitably coded, directly over all installed pipes at a depth of 18 inches below the finished surface.

**3.20 CONNECT SEWERS TO EXISTING STRUCTURES**

A. Contractor shall connect the system to existing structures where indicated. For brick structures, a hole not more than 4 inches larger than the outside diameter of new pipe shall be cut neatly in structure, new pipe laid so it is flush with inside face of structure, and annular space around pipe filled with a damp, expanding mortar or grout to make a watertight seal. For precast structures, core proper size hole in structure for pipe being connected, attach flexible sleeve into cored hole and connect new pipe into flexible sleeve with a stainless steel band.

**3.21 FIELD QUALITY CONTROL**

A. Soil and density tests shall be made by a testing laboratory acceptable to the Engineer. Laboratory tests of the soil shall be made in accordance with ASTM D 1557. In–place density tests shall be made in accordance with ASTM D 6938. Results of the tests shall be furnished to the Engineer.
The minimum number of tests required shall be:

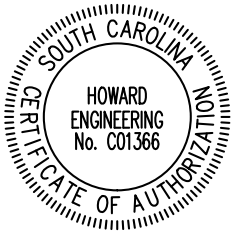
| | |
|---|---|
| Backfill over sewer in traffic areas……. | 1 per 100 linear feet or less for each 4 feet of depth or portion thereof. |
| Backfill over sewer in non–traffic areas… | 1 per 500 linear feet or less for each 6 feet of depth or portion thereof. |

END OF SECTION

Section 48 00 00

Electrical Specifications:

| | |
|---|---|
| 13325 | Remote Terminal Unit |
| 16260 | Generator |
| 16400 | Electrical |


6-6-24

## SECTION 13325

## CELLULAR REMOTE TERMINAL UNIT

## PART 1 - GENERAL

### 1.1 DESCRIPTION

A. Work included: Furnish and install a remote terminal unit for the Colleton County MEGA Site Pump Station as shown on the Drawings to perform the intended function and as needed for a proper and complete installation ready for operation.

B. Equipment shall be fabricated, assembled, installed and placed in proper operating condition in full conformity with detail drawings, specifications, engineering data, instructions and recommendations of the equipment manufacturer as approved by the Engineer.

C. 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 13320 – Flow Metering and Process Instrumentation
3. Section 16400 - Electrical.

### 1.2 QUALITY ASSURANCE

A. Referenced suppliers are as follows:

1. Watershed Process Sales, LLC.

These are named to establish standards of quality. Equal products of other manufacturers complying with these Specifications may be provided.

B. Technical services: The system supplier shall provide the services of a field service engineer, complying with Section 01660 and the following:

1. Installation.
2. Start-Up and training.

### 1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Product data: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:

1. Equipment specifications, details of connections, wiring, range and dimensions.
2. Detailed information including manufacturer's descriptive literature.
3 Physical size with dimensions, enclosure NEMA classification and mounting details.

D. Provide Operation and Maintenance Manual, complying with pertinent provisions of Section 01650 and/or the following:

### 1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01640.

### 1.5 WARRANTY

A. Comply with pertinent provisions of Section 01650.

## PART 2 - PRODUCTS

### 2.1 GENERAL

A. Latest Design: All of the equipment shall be the manufacturer's latest and proven design.

## 2.2 REMOTE TERMINAL UNIT

A. General:

1. Provide station with a PLC based system capable of monitoring and controlling remotely located equipment and transmitting alarms and data over internet network via a Virtual Private Network (VPN).
2. The RTU shall be enclosed in a NEMA 4, 304 SS enclosure and include a surge suppressor.
3. The monitor shall be powered by 120 volts AC and have a built in battery backup capable of keeping the RTU powered for 4 hours in case of primary AC failure.
4. The monitor shall be capable of monitoring and controlling up to ten (10) digital inputs, two (2) 4-20mA analog inputs and six (6) relay outputs (20A@120VAC resistive). The PLC shall be expandable with IO modules to meet the requirements of the application and provide a 20% spare inputs and outputs.
5. See the drawings for input/output list.
6. Include a Communications Enclosure to house ISP equipment and firewall/router. The communications enclosure shall include surge suppression, battery backup, ventilation for heat removal and condensation heater for moisture protection. The enclosure shall be 304 SS.
7. Contractor/Owner is to provide the internet service at the site.
8. The unit shall be configured for operation on the Owner's existing SCADA System and be part of the established alarm protocol and operator call outs..

B. Hardware

1. PLC shall be Unitronics Vision series PLC to conform to existing SCADA equipment, utilize existing spare parts, and facilitate communications.
   a. PLC software shall be free to obtain and use.
   b. Supplier shall supply the program in a digital format for re-installation in the event of failure.
   c. No license shall be required to use the software or reload the software.
2. Firewall/Router shall be a Sonicwall TZ 270 configured with the network protocol established by the WWTP network.
3. Remote Telemetry Unit shall be UL certified.

C. HMI Software

1. Existing Plant HMI shall be upgraded to include the lift station.
   a. The lift station shall be located on a map of the city.
   b. The lift station shall include one page of graphics depicting the pump station.
   c. Graphics shall display level from an installed level transducer or shall indicate only high level and operation status if a float based system.
2. The RTU HMI shall include graphics on the screen for displaying the status of the lift station.

# PART 3 - EXECUTION

## 3.1 GENERAL INSTALLATION

A. The equipment shall be installed in accordance with the manufacturer's instructions, approved shop drawings and the Engineer's approval and direction. The locations of equipment shown on the Drawings are approximate only. Exact locations shall be as approved by the Engineer during construction. Obtain in the field all information relevant to the placing of process control work and in case of any interference with other work, proceed as directed by the Engineer and furnish all labor and material necessary to complete the work in an approved manner.

B. All work shall be executed in full accordance with codes and local rulings. Should any work be performed contrary to said rulings, ordinances and regulations, the Contractor shall bear

full responsibility for such violations and assume all costs arising there from. The Contractor shall demonstrate that all installation is by a certified electrician. Work not by an electrician will not be accepted.

C. The system supplier, acting through the Contractor, shall coordinate the installation, the placing and location of system components, their connections to the process equipment, cabinets and devices, subject to the Engineer's approval. He shall be responsible to ensure that all field wiring for power and signal circuits are correctly done in accordance with best industry practice and provide for all necessary system ground to ensure a satisfactory installation. The Contractor hereunder shall schedule and coordinate his work under this Section with that of the electrical work specified under applicable sections of Division 16.

## 3.2 SERVICE

A. The Contractor shall furnish the services of the system suppliers' service technician for startup and training on new remote terminal unit.

B. The Contractor shall furnish a system supplier's representative for field training on site and consist of up to one (1) hour of instruction for four (4) of the Owner's personnel. The program shall cover: Equipment debugging, troubleshooting, calibration and maintenance procedures, and system operation. This training program may be held after startup but must be coordinated with the Owner.

## 3.3 MEASUREMENT AND PAYMENT

A. No separate measurement or direct payment will be made for the items 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 16260

# STANDBY ELECTRIC POWER SYSTEM

## PART 1 - GENERAL

### 1.1 DESCRIPTION

A. Work included: Provide an engine driven standby electric generator system where shown on the Drawings, as specified herein, and as needed for a complete and proper installation including, but not necessarily limited to:

1. Diesel engine.
2. Engine instruments and controls.
3. Alternator.
4. Control panel.
5. Exhaust silencer.
6. Weather-protective, sound attenuated, non- walk-in enclosure.
7. Associated accessories and other items and services required to complete the system whether particularly mentioned or not.
8. Fuel tank (filled on site).
9. Automatic transfer switch (specified in 16400)

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 16400 – Electrical.

C. Applicable Standards

1. NFPA 70: National Electrical Code
2. NFPA 110: Standard for Emergency and Standby Power Systems
3. UL508: Standard for Industrial Control Equipment
4. UL2200: Standard for Stationary Engine Generator Assemblies
5. UL142: Standard for Steel Aboveground Tanks for Flammable and Combustible Liquids
6. CSA C22.2 No. 14: Industrial Control Equipment
7. CSA C282: Emergency Electrical Power Supply for Buildings
8. CSA C22.2 No. 100: Motors and Generators
9. EN61000-6: Electromagnetic Compatibility
10. EN55011: Limits and Methods of Measurement of Radio Disturbance Characteristics of Industrial, Scientific and Medical (ISM) Radio-frequency Equipment
11. FCC Part 15 - Radio Frequency Devices - Subpart B-Unintentional Radiators
12. ISO 8528: Reciprocating Internal Combustion Engine Driven Alternating Current Generating Sets
13. IEC 61000: Electromagnetic Compatibility

### 1.2 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. Approved manufacturer is Caterpillar and is named to establish standards of quality. Equal products of other manufacturers conforming to these specifications may be provided as outlined in the bid form and as approved by the Engineer.

C. The system shall be factory assembled and tested by the manufacturer of the generating system or be assembled and tested by an authorized representative of the manufacturer using an engine or generator made by the system manufacturer so that the system will have one source of supply and responsibility. The performance of the generating set series shall be certified by an independent testing laboratory as to the set's full power rating, stability and voltage and frequency regulation.

D. The manufacturer of the generating system shall maintain a thoroughly stocked authorized parts and service facility within 100 miles of the installation.

E. Technical services:

1. Provide a service engineer, complying with requirements of Section 01660 to complete the initial start-up, make proper and complete adjustments of all adjustable devices, load switches, etc., and to also verify and approve all connections prior to any test operation of said equipment.
   a. One 2-day trip.
2. Confirmation in writing by the manufacturer's authorized representative of said services shall be submitted to Engineer.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Product data: Within 30 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. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
3. Shop Drawings in sufficient detail to show fabrication, installation, anchorage, and interface of the work of this Section with the work of adjacent trades.
4. Manufacturer's recommended installation procedures which, when approved by the Engineer, will become the basis for accepting or rejecting actual installation procedures used on the Work.

C. Upon completion of the work of this Section, and as a condition of its acceptance, deliver to the Engineer five copies of an operation and maintenance manual compiled in accordance with the provisions of Section 01650 of these Specifications.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01640.

1.5 WARRANTY

A. Comply with provisions of Section 01650 and the following.

B. Provide a standard two-year warranty on all labor, materials, and equipment of the generating system.

1. Upon placing the generator in service provide a 30-day initial operating period.
2. The warranty will begin upon successful completion of the initial operating period.

1.6 EXTENDED SERVICE AGREEMENT

A. Provide a Total Maintenance and Repair agreement that covers all of the maintenance and repair costs during a period of 5 years at an annual frequency from the date of acceptance. This agreement includes 100% coverage of parts and labor for defects in materials and workmanship on all components from the manufacturer; excluding 'consumables' (WARRANTY).

B. This agreement also covers predictive dealership maintenance to include 'consumables': oil, oil filters, fuel filters, air filters, batteries, belts, hoses, coolant, temperature regulators, and all other predictive 'consumable' components serviced at regular intervals in accordance with the manufacturer's guidelines.

1.7 RULES AND PERMITS

A. The entire installation shall be in accordance with NFPA, and all local codes.

B. The Engineer will obtain all permits and inspections required by local or state laws.

C. Furnish the Owner with certificate of inspection and final approval from all authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide new and current system equipment consisting of:

1. Engine driven electric generating set to provide standby power.
2. Engine start-stop control system mounted on the generating set.
3. Mounted accessories as specified.

2.2 SYSTEM

A. Provide generator rated for continuous standby service at 100 KW (minimum), 125_KVA at 0.8-power factor, 277/480 volt, 3-phase, 4-wire wye. Continuous standby service constitutes full load operation without interruption for a minimum period of 14 days.

2.3 ENGINE

A. Provide fuel filter and fuel transfer pump at engine.

B. Provide water-cooled with mounted radiator, fan and water pump.

C. Provide intake and exhaust valves made of heat resisting alloy steel with exhaust valve seat inserts.

D. Supply full pressure lubrication by lube oil pumps.

E. Provide air cleaner, fuel and oil filters with replaceable elements, and lube oil cooler.

F. Govern engine speed by electronic governor to maintain the alternator frequency within one (1) hertz from no load to full load alternator output.

G. Provide remote, 2-wire starting by a solenoid shift, electric starter.

H. Directly connect the starter to the engine flywheel housing.

## 2.4 ALTERNATOR

A. Provide brushless, 4-pole, revolving field design with temperature compensated solid-state voltage regulator and rotating rectifier exciter system.

1. Provide rotor driven through a semi-flexible driving flange to ensure permanent alignment.
2. Provide alternator with frequency regulation not exceeding 3 Hz from no load to rated load.
3. Provide alternator with voltage regulation within +/-2% of rated voltage, from no load to full rated load.
4. Provide alternator with recovery to stable operation occurring within 2 seconds.
   a. Stable operation is defined as operation with terminal voltage remaining constant +/-1% of rated voltage.
5. Provide alternator with a rheostat providing a minimum of +/-5% voltage adjustment from rated value.
6. Provide alternator with temperature rise within NEMA MG1-22 definition.
7. Provide alternator utilizing 3-phase filtered sensing voltage regulation and having an independent power supply for the excitation system (i.e. permanent magnet generator, Auxiliary Winding, Regulator Exciter Principle (AREP) and series boost type excitation system).
8. Provide alternator with a sub-transient reactance of 0.12 per unit, or lower, based on steady-state rating.
9. Provide alternator with Class H insulation.
10. Provide alternator producing a voltage waveform for proper operation of variable frequency PWM drives that produce line to neutral total harmonic distortion to 5% maximum with a maximum 3% distortion in any single harmonic order.
11. Equip alternator with a 120 volt, single-phase space heater.

## 2.5 CONTROLS

A. Provide a fully solid-state, microprocessor based, generator control panel wired, tested and shock mounted on the generating set by the manufacturer of the generating plant.

B. Provide the following functionality integral to the control panel:

1. A minimum 64 x 240 pixel (28mm x 100mm) white backlight graphical display with text based alarm/event descriptions.
2. A minimum of 3-line data display.
3. Audible horn for alarm and shutdown with horn silence switch.
4. Standard ISO labeling
5. Multiple language capability
6. Remote start/stop control
7. Local run/off/auto control integral to system microprocessor
8. Cooldown timer
9. Speed adjust
10. Lamp test
11. Push button emergency stop button
12. Voltage adjust
13. Voltage regulator V/Hz slope – adjustable
14. Power Factor Control for paralleling units
15. Password protected system programming

C. Provide the panel with the following Digital indications:

1. AC voltage, 3-phase (L-L and L-N)
2. AC amps (3-phase and total)
3. KW (total and per phase)
4. KVA (total)
5. KVAR (total)
6 KWHR (total)
7. KVARHR (total)
8. PF (average total and 3-phase)
9. % of rated (total)
10. Frequency
11. DC voltage
12. System diagnostic
13. Excitation voltage
14. Excitation current
15 Engine oil pressure
16. Engine oil temperature
17. Engine coolant temperature
18. Engine RPM
19. Battery volts
20. Engine hours
21. Engine crank attempt counter
22. Engine successful start counter
23. Service maintenance interval
24. Real time clock
25. Oil filter differential pressure
26. Fuel temperature
27. Fuel pressure
28. Fuel filter differential pressure
29. Fuel consumption rate
30. Total fuel consumed
31. Engine intake manifold temperature
32. Engine intake manifold pressure
33. Engine crankcase pressure
34. Air filter differential pressure
35. Boost pressure
36. Oil filter differential pressure

D. Provide alarm indication and subsequent shutdown for the following conditions (Store in the control panel the first and last occurrences of all alarms and shutdowns with a time, date, and engine hour stamp):

1. Low oil pressure alarm/shutdown
2. High coolant temperature alarm/shutdown
3. Loss of coolant shutdown
4. Overspeed shutdown
5. Overcrank shutdown
6. High intake manifold temperature alarm/shutdown
7. High exhaust manifold temperature alarm/shutdown
8. High crankcase pressure alarm/shutdown
9. High air inlet temperature alarm/shutdown
10. Emergency stop depressed shutdown
11. Low coolant temperature alarm
12. Low battery voltage alarm
13. High battery voltage alarm
14. Control switch not in auto position alarm
15. Battery charger failure alarm
16. Generator over voltage

17. Generator under voltage
18. Generator over frequency
19. Generator under frequency
20. Generator reverse power
21. Generator overcurrent
22. Loss of excitation alarm/shutdown
23. Instantaneous over excitation alarm/shutdown
24. Time over excitation alarm/shutdown
25. Rotating diode failure
26. Loss of sensing
27. Loss of PMG
28. Provide 3 programmable dry contacts configured as directed by Owner.

E. Provide the ability to accept six (6) programmable digital input signals.

F. Provide accessible through a single electronic service tool all engine, voltage regulator, control panel and accessory units. Provide the following maintenance functionality:

1. Engine running hours display
2. Service maintenance interval (running hours or calendar days)
3. Engine crank attempt counter
4. Engine successful starts counter
5. 20 events are stored in control panel memory
6. Programmable cycle timer that starts and runs the generator for a predetermined time. The timer shall use 14 user-programmable sequences that are repeated in a 7-day cycle. Each sequence shall have the following programmable set points:
   a. Day of week
   b. Time of day to start
   c. Duration of cycle

G. Provide an annunciator to meet the requirements of NFPA 110, Level 1.

1. Network directly to the generator set control
2. Include a lamp test pushbutton, alarm horn and alarm acknowledge pushbutton
3. Provide the following individual light indications for protection and diagnostics:
   a. Overcrank
   b. Low coolant temperature
   c. High coolant temperature warning
   d. High coolant temperature shutdown
   e. Low oil pressure warning
   f. Low oil pressure shutdown
   g. Overspeed
   h. Low coolant level
   i. EPS supplying load
   j. Control switch not in auto
   k. High battery voltage
   l. Low battery voltage
   m. Battery charger AC failure
   n. Emergency stop
   o. Spare
   p. Spare

H. Equip unit with factory mounted terminal blocks and strips for all power, signal and control wiring connections.

## 2.6 GENERATING SET MOUNTING

A. Equip generator set with vibration isolators and mount on a welded steel base that will provide suitable mounting to any level surface.

B. Equip unit with a reinforced sheet steel, minimum 16 gauge, sound attenuating, non-walk-in weather-protective housing.

1. Reinforce to be vibration-free in the operating mode.
2. Provide housing with lockable removable panels on each side of the housing to access generator with a hinged door to access instrument panel.
3. Provide housing complete with accessories listed below, be rust treated and painted standard color of manufacturer.
4. Provide peaked roof for drainage.
5. Provide corrosion resistant fasteners.
6. Extend coolant and oil drain line connections outside of enclosure.
7. Insulate enclosure to limit unit noise to 74 db at 23 ft.
8. Mount enclosure over an integral welded steel base fuel tank complete with all fuel fittings, level indicator, vent, exterior lockable fill port and drains, etc., and necessary galvanized steel support framing so that the weight of the generator is not supported by the tank. Size tank to run the generator at full load for a minimum of 2 days.
   a. Enclose tank in a welded steel secondary containment vessel having an audible spill alarm system powered from the generator battery system and alarmed on the generator control panel.
   b. All welds, cuts, openings, etc., in the steel material, shall be cold galvanized as a minimum after fabrication.
9. Provide tank underwriter's labeled (UL).

## 2.7 ACCESSORIES

A. Provide the plant with all accessories needed for proper operation to include, but not be limited to:

1. A critical type silencer of carbon steel mounted inside enclosure.
2. Stainless steel flexible exhaust connection.
3. Sufficient exhaust piping of aluminized schedule 40 steel pipe and fittings, including end rain cap.
4. Lace-up type insulation blankets to completely insulate muffler and interior exhaust piping.
5. Provide a 10-amp, automatic "float" type battery charger to maintain the batteries at normal capacity.
   a. Provide 120V input with 12 VDC output to battery(s).
   b. Provide cables, battery rack, AC compensation, current limit, DC ammeter to show battery voltage, equalizing switch, fused AC input and DC output, complete isolation of AC input and DC output.
   c. Design as not to discharge the battery in event of failure.
6. Provide engine mounted, thermostatically controlled, immersion type heater to ensure a minimum coolant temperature of 120° F in a minimum ambient temperature of –15° F.
   a. Operate on a 120 volt, single-phase AC power.
7. Engine Block Heaters sized per manufacturer's requirements. Any required increase of feeder circuits, different from that as shown on drawings, is the responsibility of the Contractor to provide and install at no additional cost to the Owner.

8. all generator accessories shall be fed from a single 30 amp, 120v, 1p branch circuit.

B. Radiator coolant shall be all weather, all season, environment friendly 50% solution antifreeze.

C. Provide adequate fuel to fill tank

D. Overcurrent Protection:

1. Furnish the engine/generator set with overcurrent output protection per the latest edition of NEC 445-4 at the engine/generator set.
2.
3. Provide Ground-Fault Protection of service entrance disconnects 1000 amperes or more at 277/480V per NEC 70 Part 230-95.

## 2.8 IDENTIFYING SIGNS

A. Provide identifying signs as shown on drawings and as specified herein for proper installation and in accordance with latest edition of National Electrical Code.

1. Sign design is based on use of standard products manufactured by Seton Name Plate Company of New Haven, CT and is named to establish standards of quality.
2. Provide the products upon which design is based or provide equal products of another manufacturer approved in advance by the Engineer.
3. Provide sign material as 60 mils. thick press polished high performance vinyl plastic.
4. Provide sunlight fade resistance.
5. Overcoat with Tedlar.
6. Provide rounded corners.
7. Provide 14" x 10" sign.
8. Main heading to read: "CAUTION", white letters on red background with black border. Subtitle to have black letters on white background.
9. Mount with stainless steel screws at location as directed in field.
10. Sign schedule:

| AREA | SIGN SUBTITLE | NO. SIGNS PER AREA |
|---|---|---|
| Service Entrance | Standby Emergency Generator Onsite | 1 |
| System Ground Connection Point | Normal Service and Standby Emergency Generator Connected to Grounding Electrode | 1 |

11. Install sign in strict accordance with the manufacturer's recommendations as approved by the Engineer, using only the approved mounting materials, and locating all components firmly into position, level and plumb.
12. Locate where directed by the Engineer.
13. Mounting hardware to be Type 316 stainless steel.
14. Where adequate sign supports are not available, fabricate sign stand using Type 316 stainless steel channel and fittings.

# PART 3 - EXECUTION

## 3.1 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.

## 3.2 INSTALLATION

A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.

B. Install the work of this Section in strict accordance with the manufacturer's recommendations as approved by the Engineer.

C. Put all components through at least five complete cycles of operation, adjust as required, and verify that the complete system functions at optimum operating level.

## 3.3 TESTING AND INSPECTION

A. Provide personnel and equipment, make required tests, and secure required approvals from the Engineer and governmental agencies having jurisdiction.

B. Make written notice to the Engineer adequately in advance of each of the following stages of construction:

1. In the underground condition prior to placing concrete floor slab, when all associated electrical work is in place.
2. When all rough-in is complete, but not covered.
3. At completion of the work of this Section.

C. An operational test of the standby power system shall be conducted by a representative of the manufacturer of this equipment in the presence of the Engineer and the operating personnel. It shall be demonstrated during these tests that the voltage sensitive and time delay devices perform at their specified settings.

D. Perform 2 hour load bank test for each generator.

E. When material and/or workmanship are found to not comply with the specified requirements, within three days after receipt of notice of such non-compliance remove the non-complying items from the job site and replace them with items complying with the specified requirements, all at no additional cost to the Owner.

## 3.4 PROJECT COMPLETION

A. Upon completion of the work of this Section, thoroughly clean all exposed portions of the system installation, removing all traces of soil, labels, grease, oil and other foreign material, and using only the type cleaner recommended by the manufacturer of the item being cleaned.

B. Thoroughly indoctrinate the Owner's operation and maintenance personnel in the contents of the operations and maintenance manual required to be submitted under Part 1.3 of this Section of these Specifications.

## 3.5 COMPUTATIONS

A. The Pump Station will include the following:

| Step Number | Motor Load | Motor Control | Residual Load |
|---|---|---|---|
| 1 | 1 @ 40 HP | VFD | 10 kW |
| 2 | 1 @ 40 HP | VFD | |

B. Base computations on reduced-voltage starters with 225% current limit setting and variable frequency drives with 6-pulse rectifiers.

C. The manufacturer shall submit computations indicating that the unit furnished will satisfactorily operate with equipment to be connected as stated above.

D. Maximum voltage drop of 20%.

3.6 MEASUREMENT AND PAYMENT

A. No separate measurement or direct payment will be made for this work and all costs for same shall be included in the price bid for the work to which it pertains.

END OF SECTION

SECTION 16400

ELECTRICAL

## PART 1 – GENERAL

### 1.1 DESCRIPTION

A. Work included: Provide a complete electrical system as indicated on the Drawings, as specified herein, and as needed for a complete and proper installation including, but not necessarily limited to:

1. Main service, main breaker and ATS.
2. Feeder system, in conduit.
3. Branch circuit panels for power and lighting.
4. Branch circuit wiring, in conduit, for lighting, receptacles, junction boxes and motors.
5. Hangers, anchors, sleeves, chases, supports for fixtures, and other electrical materials and equipment in association therewith.
6. Lighting fixtures and lamps.
7. Wiring system, in conduit, for equipment and controls provided under other Sections of these Specifications including, but not necessarily limited to, Equipment and Mechanical Sections.
8. Motor starters and controls for motors provided under the Contract, but for which motor starters and controls are not otherwise provided.
9. Telephone conduit system.
10. Surge suppression device.
11. Other items and services required to complete the systems whether particularly mentioned or not.

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 16260 – Engine Driven Standby Electrical Power System.

### 1.2 ABBREVIATIONS

| | | | |
|---|---|---|---|
| A | Ampere (Amps) | MCA | Minimum Circuit Amps |
| AFF | Above Finished Floor | MCC | Motor Control Center |
| AFG | Above Finished Grade | MCM | 1000 Circular Mils (KCMIL) |
| AHJ | Local Authority Having Jurisdiction | MOCP | Maximum Over-current Protection |
| AIC | Amps Interrupting Current | N | Neutral |
| AFCI | Arc-Fault Circuit Interrupter | NEC | 2011 National Electrical Code |
| ANSI | The American National Standards Institute | NEMA | National Electrical Manufacturers Association |
| BF | Ballast Factor | NFPA | National Fire Protection Association |
| Bkr. | Breaker | NIC | Not in Contract |
| C | Conduit | OSHA | Occupational Safety and Health Act |
| Ckt. | Circuit | PF | Power Factor |
| CRI | Color Rendering Index | PLC | Programmable Logic Controller |
| CU | Copper Conductor | PVC | Polyvinyl Chloride Conduit |
| DETD | Dual Element Time Delay Fuse | RGSC | Rigid Galvanized Steel Conduit |
| Disc. | Disconnect | RMS | Root Mean Square |
| Dn | Down | RTU | Remote Terminal Unit |
| EMT | Electrical Metallic Tubing | SCADA | Supervisory Control and Data Acquisition |

| | | | |
|---|---|---|---|
| FLA | Full Load Amps | SCCR | Short-Circuit Current Rating |
| FPM | Fuse per Manufacturer Requirements | SPD | Surge Suppression Device |
| FS | Federal Specifications | Sym | Symmetrical |
| G or Gnd. | Ground | THD | Total Harmonic Distortion |
| GFCI | Ground-Fault Circuit Interrupter | TSP | Twisted Shielded Pair |
| GFP | Ground-Fault Protection | TST | Twisted Shielded Triplet |
| HD | Heavy Duty | TVSS | Transient Voltage Surge Suppressor |
| HP | Horsepower | UL | Underwriters Laboratories Inc. |
| IBC | International Building Code | UON | Unless Otherwise Noted |
| IEEE | The Institute of Electrical and Electronics Engineers | V | Volts |
| IMC | Intermediate Metallic Conduit | W | Watts |
| KVA | Kilovolt-Amps | WFC | Watertight Flexible Conduit |
| KW | Kilo Watt | WG | Wire Guard |
| KA | Kilo Amps | XFMR | Transformer |
| LCCF | Lamp Current Crest Factor | | |

## 1.3 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. These shall include, but not be limited to, an electrical supervisor who is a licensed master electrician, a field foreman with a minimum journeyman electrician's license and adequate electricians and helpers.

B. Without additional cost to the Owner, provide such other labor and materials required to complete the work of this Section in accordance with the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in these Contract Documents.

C. Electrical subcontractor shall furnish a 100 percent performance bond and a 100 percent payment bond to the Contractor as security for the faithful performance of this Section, as security for the payment of all persons performing labor on the project under this Section and furnishing materials in connection with this Section The performance bond and payment bond shall be in separate instruments.

## 1.4 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Product data: Within 30 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. Manufacturer's specifications, other data and shop drawings needed to prove compliance with the specified requirements. Provide the following approval drawings:

    a. Main Breaker.
    b. ATS
    c. Panelboards.
    d. Mini-power zone.
    e. Wiring devices and cover plates.
    f. Conduit and fittings.
    g. Conductors.

h. Connectors.
i. Lighting fixtures.
j. Surge Suppression Device.
k. Special systems.
l. Plan of action for each site.

3. Manufacturer's recommended installation procedures which, when approved by the Engineer, will become the basis for accepting or rejecting actual installation procedures used on the Work.

C. Samples:

1. When so requested by the Engineer.
2. When specifically so requested by the Contractor and approved by the Engineer, approved samples will be returned to the Contractor for installation on the Work.

D. Manual: Upon completion of this portion of the Work and as a condition of its acceptance, provide operation and maintenance manuals in accordance with the provisions of Section 01650 of these Specifications. Include within each manual:

1. Copy of the approved Record Documents for this portion of the Work.
2. Copies of all circuit directories.
3. Copies of all warranties and guaranties.

1.5 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01640.

1.6 WARRANTY

A. Provide standard one (1) year warranty on all labor and materials.

B. Provide a five (5) year warranty on ballasts for all LED fixtures.

C. Provide minimum five (5) year warranty on Surge Protection Devices, incorporating unlimited replacements of suppressor parts if destroyed by transients during the warranty period.

D. Provide standard five (5) year parts and labor warranty on automatic transfer switch.

1.7 RULES AND PERMITS

A. The entire installation shall be in accordance with the latest edition of the NEC, OSHA, and all local codes.

B. Apply and pay for all permits and inspections required by local or state laws.

C. Furnish the Owner with certificate of inspection and final approval from all authorities having jurisdiction.

D. Installers of PVC Coated Conduit shall be certified and be able to present a valid, unexpired installer certification card prior to installation taking place.

1.8 DRAWINGS

A. The drawings and specifications are complementary to each other and what is called for by one shall be as binding as if called for by both. The drawings are diagrammatic and are to be followed as closely as the construction will permit.

B. The drawings show the general location of outlets, conduits and circuit arrangement. Because of the small scale of the drawings, it is not possible to indicate all of the detail involved. The Contractor shall carefully investigate the structural and finish conditions affecting all his Work and shall arrange such work accordingly, furnishing such fittings, junction boxes and accessories as may be required to meet such conditions.

1.9 ELECTRICAL SERVICE

A. From the utility company, establish requirements for transformer pad(s), metering, connections, etc., and make provisions for them; providing and installing all lugs, connectors, grounding, etc., required for a complete installation.

1. Coordinate work with both the electric utility company and the Owner, and schedule the installation of the service in accordance with the construction schedule such that there will be no delays in equipment startup and placing the facilities in operation.

B. Local Utility Company is Coastal Electric Cooperative.

1.10 ELECTRICAL OUTAGE

A. Coordinate all outages with the Owner, 72 hours prior. Schedule all outages such that they will not interfere with normal plant operation and that there will be no delays in equipment startup and placing the facilities in operation.

1.11 SPARE PARTS

A. Provide the following spare parts to Owner in neatly packaged box marked with contents:

1. Keys: One (1) set of spare panelboard/switchboard keys with lists to Owner.
2. Fuses: One (1) box fuses for each type and size installed on the project.
3. Fuse Puller: One (1) fuse puller to Owner capable of removing all types of fuses installed on job.
4. SPD: One (1) SPD protection module per unit as an on-site spare.
5. Control and Lighting Fixture Lamps: Ten (10) percent of quantity furnished, minimum of one of each type.
6. Ballasts: Ten (10) percent of quantity furnished, minimum of one of each type.
7. Lenses: Three (3) percent of quantity furnished, minimum of one of each size and type.

PART 2 – PRODUCTS

2.1 GENERAL

A. Provide only materials that are new, of the type and quality specified. Where Underwriters' Laboratories, Inc. have established standards for such materials, provide only materials bearing the UL label. Materials called for are to be

considered as standard that, however, implies no right on the part of the Contractor to substitute other materials and methods without written authority from the Engineer.

B. Temporary power:

1. In addition to providing temporary power as described in Section 01500 of these Specifications, provide and pay the costs for installing permanent electrical meter or meters.
2. When all equipment is in place and connected, and the Engineer determines the project is ready for final checkout, arrange to have the permanent metering installed in the Owner's name. At this point, the Owner will be responsible for all charges.

C. Where any material or operation is specified by reference to published specifications or standards or the specifications or standards of any other organization; the referenced specification or standard shall be as much a part of this Section as if quoted in full herein.

2.2 RACEWAYS

A. Applicable Standards:

1. ANSI C80.1: Rigid Steel Conduits, Zinc-Coated.
2. ANSI C80.3: Electrical Metallic Tubing, Zinc Coated.
3. ANSI C80.5: Rigid Aluminum Conduits.
4. ANSI C80.6: Intermediate Metallic Conduits.
5. ANSI/NEMA FB1: Fittings and Supports for Conduit and Cable Assemblies.
6. UL 6: Rigid Steel Conduit – Zinc Coated.
7. UL 651-2002: Schedule 40 PVC and schedule 80 Rigid PVC Conduit.
8. UL 514B: Flexible conduit fittings.
9. NEMA RN 1: Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
10. NEMA FB 1: Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing and Cable.
11. ASTM F512: Polyvinyl Chloride (PVC) Conduit.
12. ASTM D870: Standard Practice for Testing Water Resistance of Coatings Using Water Immersion.
13. ASTM D1151: Standard Practice for Effect of Moisture and Temperature on Adhesive Bonds.
14. FS WW-C 581E: Federal Specification for Rigid Galvanized Steel Conduit.
15. FS-WW-C-563A: Federal Specification for Electrical Metallic Tubing.
16. FS-WW-C-540C: Federal Specification for Rigid Aluminum Conduit.
17. FS WW-C 566: Federal Specification for Flexible Metal Conduit.

B. Acceptable Manufacturers:

1. Wheatland.
2. Allied Tube.
3. Perma-Cote; Division of Robroy.
4. Ocal.
5. Plasti-Bond
6. Carlon.
7. KorKap

C. Provide conduit and fittings conforming to the above standards.

D. Rigid galvanized steel conduit and fittings – types:

1. Provide threaded type fittings and form 8 conduit bodies with material to match conduit. Provide PVC coated fittings for PVC coated rigid galvanized steel conduit installations.
2. Provide rigid galvanized steel conduit with external 40-mil PVC coating and internal, 2-mil urethane surface.
3. Provide seal fittings for rigid galvanized steel conduit where indicated on the plans equal to Crouse-Hinds series EYSX. Provide PVC coated seal fittings for PVC coated rigid galvanized steel conduit installations.
4. Provide sealing compound and fiber by Crouse-Hinds or approved equal:
   a. Sealing Compound: Chico A.
   b. Sealing Fiber: Chico X.
5. Provide USA manufactured base materials for PVC coated fittings, hangers, straps, etc.

E. Provide compression type fittings and conduit bodies with matching material for electrical metallic tubing conduit.

F. Rigid aluminum conduit:

1. Provide threaded type fittings and form 8 conduit bodies with material to match conduit. .
2. Provide seal fittings for rigid aluminum conduit where indicated on the plans equal to Crouse-Hinds series EYSX. Provide sealing compound and fiber by Crouse-Hinds or approved equal:
   c. Sealing Compound: Chico A.
   d. Sealing Fiber: Chico X.
3. Provide thread type fittings and conduit bodies with matching material.
4. Provide standard aluminum electric conduit couplings
   a. Do not use pipe couplings or sleeves.
5. Provide aluminum fittings.
6. Do not imbed aluminum conduit concrete containing chlorides, unwashed beach sand, sea water, or coral bearing aggregates without PVC coating, heat shrink or two coats of bitumastic.
7. Use strap wrenches for tightening aluminum conduit.
   a. Do not use Pipe wrenches, channel locks, chain wrenches, pliers, etc.
8. Clean and coat all threads on aluminum conduit and fittings with “No-Oxide” compound before using.
9. Completely cover Aluminum conduit installed in concrete or below grade with two(2) coats of bitumastic paint or PVC coating.
10. Terminate aluminum conduit entering manholes and below grade pullboxes with grounding type bushings and connected to a 3/4" x 10” copperclad rod with a #6 bare copper wire.
11. All risers from underground, concrete pads, floors, etc.
    a. Provide heat shrink tubing (Raychem or equal) from a point 12 inches below bottom of slab or grade to a point not less than 6 inches above grade or surface of slab.

G. Provide aluminum flexible conduit for flexible installations.

H. Conduit/Cable supports – properties:

1. Provide 316 stainless steel supports for all exposed metallic conduit as manufactured by Unistrut or approved equal.
2. Provide fiberglass supports for all exposed non-metallic conduit/cable as manufactured by Aickinstrut or approved equal.

3. Provide one-hole, PVC coated, malleable iron conduit straps with back spacer for all PVC coated rigid galvanized steel conduit.
4. Provide PVC coated beam clamps with uncoated 316 stainless steel nuts and bolts for all PVC coated rigid galvanized steel conduit.
5. Provide stainless steel strain relief and cable grips/supports for power cables. Tie each support of to the hanger support.

I. All conduits to conform to the following specifications:

1. Installations under concrete slab: Schedule 40 PVC
2. Exposed outdoor locations: Rigid aluminum conduit.
3. Installations in concrete-encased duct banks: Schedule 40 PVC.
4. Installations underground exposed to earth: Rigid aluminum conduit with PVC or other coating.

## 2.3 CONDUCTORS

A. Applicable standards:

1. NEMA WC 3: Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
2. NEMA WC 5: Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
3. UL 44 – 2002: Rubber-Insulated Wires and Cables.
4. UL 83 – 1999: Thermoplastic-Insulated Wires and Cables.
5. UL 854 – 2002: Service Entrance Cables.

B. Conductors Acceptable Manufacturers:

1. Okonite.
2. Pirelli.
3. Southwire.
4. Superior Essex.
5. Belden.

C. Connectors Acceptable Manufacturers:

1. ILSCO
2. Polaris

D. Conductor types:

1. Low voltage conductors (0 to 600V):
   a. For secondary service entrance, feeders, underground, under floor, in damp or wet locations, and to any process associated equipment provide copper, 600V, 90ºC, Type XHHW.
   b. For all other low voltage conductors, provide copper, 600V, 75ºC, Type THWN.
   c. Provide stranded conductors for sizes #12 and larger.
   d. Provide same type of equipment grounding conductors as specified above.
   e. Provide all branch circuit wiring installed within ballast compartment of light fixtures rated 90ºC, Type THHN.
   f. Analog Control/Communications (TSP or TST) – Provide tinned copper, polyethylene insulated, twisted pair or triplet, aluminum-polyester, overall shield with 20-gauge drain.
   g. Provide analog signal conductors sized as shown on drawings with minimum size of 18-gauge.

h. For all discrete signal conductors, provide copper stranded, 600V, Type THWN with a minimum size of #14, unless otherwise noted.
i. For all control conductors installed in underground conduits provide cable listed as suitable for direct burial.

2. Splices, Connections and Terminations (0 to 600V):
a. For #8 AWG, use solderless pressure connectors with insulating covers for copper wire splices and taps. Use insulated spring wire connectors with plastic caps for #10 AWG and smaller.
b. Use insulated, mechanical connectors for copper wire splices and taps, #6AWG and larger. Tape connectors with electrical tape to prevent moisture infiltration.
c. Where connections are located in manholes or handholes use insulated submersible type.

## 2.4 GROUNDING AND BONDING

A. Applicable standards:

1. UL 467-1998: Grounding and Bonding Equipment.
2. NFPA 70: National Electrical Code.
3. ANSI/IEEE 32: Requirements, Terms and Test Procedures for Neutral Grounding Devices.
4. IEEE 80: Guide for Safety in Substation Grounding.
5. IEEE 81: Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System.
6. NETA ATS: Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems (International Electrical Testing Associates).

B. Grounding electrodes (Rod type):

1. Acceptable Manufacturers:
a. LTV Copperweld.
b. Line Material.
2. Material: Copper-clad steel.
3. Diameter: 3/4”.
4. Length: 10’-0”
5. Type: Sectional.

C. Mechanical connectors:

1. Acceptable Manufacturers:
a. Burndy.
b. Robbins.
c. Harger.
2. Material: Bronze.

D. Exothermically-welded connections:

1. Acceptable Manufacturers:
a. Cadweld.

E. Grounding Electrode Conductor:

1. Material: Bare, soft-drawn, stranded, copper.
2. Minimum size: Meet NFPA 70 requirements.

F. Bonding Material:

1. Material: Bare, soft-drawn, stranded, copper.
2. Minimum size: Meet NFPA 70 requirements.

G. Regulatory requirements:

1. Products: Listed and classified by UL as suitable for the purpose specified and indicated.

H. Ground Access Wells:

1. Provide 12”x12”x12” polymer concrete ground access well where indicated on plans.
2. Provide engraved cover with “ground” indicator.
3. Rated for a minimum of 20,000 lbs.
4. Provide Harger GAW series or approved equal.

## 2.5 SURGE SUPPRESSION DEVICE

A. Applicable standards:

1. UL 1449 3rd Edition - Standard for Safety of Surge Protection Devices.
2. ANSI/IEEE C62.41 - IEEE Recommended Practice on Surge Voltages in Low Voltage AC Power Circuits.
3. IEEE C62.45 - IEEE Guide on Surge Testing for Equipment Connected to Low-Voltage AC Power Circuits.
4. UL 67 - Panelboards (when mounted in panelboards).
5. UL 891 - Dead-Front Switchboards (when mounted in switchboards).
6. NEMA LS1 - National Electrical Manufacturer’s Association – 1992, R2000.
7. MIL STD. 220B - Test Methods of Insertion Loss Measurement.

B. Acceptable Manufacturers:

1. Advanced Protection Technologies, Inc. (APT).
2. American Power Conversion Corporation (APC).
3. EFI Electronics.
4. Cutler Hammer.
5. Current Technology.
6. Leviton.

C. Surge Suppression Device (SPD):

1. Manufacturer’s published UL 1449 Third Edition test results shall reflect SPD connected lead length of 6” or greater.
2. Provide SPD devices with a minimum EMI/RFI filtering of -50dB at 100 kHz using MIL-STD-220A methodology.
3. Provide a SPD unit with a short circuit current rating clearly marked and install at a point on the system where the available fault current is in excess of that rating.
4. Provide dedicated circuit breaker/disconnect for the SPD.
5. Provide SPD with one set of NO/NC dry contacts.
6. Provide SPD with protection-indicating LED’s that are visible without opening enclosure.
7. Provide NEMA 4X 316 stainless steel enclosures for all interior process area and exterior installations. Provide NEMA 12 (stainless steel) in all other installations.
8. Provide SPD that meets or exceeds the following criteria:
   a. Maximum UL Suppression Voltage Rating (SVR) and Maximum

Operating Voltage (MCOV):

| System Voltage | L-N | L-G | N-G | L-L | MCOV |
|---|---|---|---|---|---|
| 120/240V 1Ø Split Phase | 330 | 330 | 330 | 700 | 150 |
| 208/120V 3Ø | 330 | 330 | 330 | 700 | 150 |
| 480/277V 3Ø | 700 | 700 | 600 | 1200 | 320 |

b. Minimum Surge Capacity and modes of protection:

| SPD Location | Modular Parallel Protection | Modes of Protection | RFI Filtering | Surge Capacity Per Mode |
|---|---|---|---|---|
| Service Entrance ≥ 800A | Yes | L-N, N-G | Yes | 320kA |
| Service Entrance >200A, < 800A | Yes | L-N, N-G | Yes | 240kA |
| Service Entrance ≤ 200A | No | L-N, N-G | No | 120kA |
| Distribution Panel ≥ 800A | Yes | L-N, N-G | Yes | 240kA |
| Distribution Panel > 400A, < 800A | Yes | L-N, N-G | Yes | 160kA |
| Distribution Panel ≤ 400A | No | L-N, N-G | No | 120kA |
| Motor Control Center ≥ 2000A | Yes | L-N, N-G | Yes | 320kA |
| Motor Control Center > 600A, < 2000A | Yes | L-N, N-G | Yes | 240kA |
| Motor Control Center ≤ 600A | Yes | L-N, N-G | Yes | 160kA |
| Branch Circuit Panels > 200A | No | L-N, N-G | No | 120kA |
| Branch Circuit Panels ≤ 200A | No | L-N, N-G | No | 80kA |

## 2.6 OUTLET BOXES

A. Applicable standards:

1. ANSI/NEMA OS 1: Sheet-steel Outlet Boxes, Device Boxes, Covers and Box Supports.
2. ANSI/NEMA OS 2: Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports.
3. NEMA 250: Enclosures for Electrical Equipment (1000 Volts Maximum).
4. NEMA FB 1: Type FD, Cast Ferroalloy Boxes.
5. UL 508: UL Standard for Safety Industrial Control Equipment.

B. B. Types and properties:

1. Outlet boxes:
   a. Sheet metal outlet boxes (ANSI/NEMA OS1; galvanized steel, with 1/2" male fixture studs where required).
   b. Nonmetallic outlet boxes (ANSI/NEMA OS2).
   c. Cast aluminum boxes where exposed. (NEMA FB1; deep type, gasketed cover, threaded hubs).

C. Pull and junction boxes:

1. Sheet metal boxes:
   a. Indoor location installations:
      1) Provide the type specified in ANSI/NEMA OS1, NEMA 12 painted steel unless stated otherwise on drawings in non-

process areas. Provide NEMA 4X stainless steel for process areas.

2) Provide hinged-type enclosure for enclosures larger than 12 inches in any dimension.

3) Provide hinged-type enclosure for enclosures larger than 12 inches in any dimension.

b. Outdoor location installations: Provide NEMA 4X 316 stainless steel.

2. Cast aluminum boxes:

a. Outdoor and wet location installations: Conform to NEMA 250; Type 4 and Type 6, flat-flanged, surface-mounted junction box, UL listed as rain tight, aluminum box cover with ground flange, neoprene gasket, and stainless steel cover screws as manufactured by Cooper Crouse-Hinds.

3. Non-metallic boxes:

a. In Ground location installations: Conform to UL 508, NEMA type as shown on drawings, pre-cast polymer concrete, with removable, heavy-duty bolted cover, and stainless steel cover screws as manufactured by Strongwell.

D. Box locations:

1. Provide electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and code compliance.

a. Electrical box locations shown on Contract Drawings are approximate unless dimensioned.

b. Verify the location of all boxes and outlets prior to rough in.

c. Locate the boxes to allow access.

d. Locate and install boxes such that headroom is maintained and a neat appearance is presented.

## 2.7 WIRING DEVICES

A. Applicable standards:

1. FS W-C-596: Electrical Power Connector, Plug, Receptacle, and Cable Outlet.
2. FS W-S-896: Switch, Toggle.
3. NEMA WD 1: General Purpose Wiring Devices.
4. NEMA WD 2: Semiconductor Dimmers for Incandescent Lamps.
5. NEMA WD 5: Specific Purpose Wiring Devices.
6. UL 943: Standard for Ground Fault Circuit Interrupters.

B. Acceptable Manufacturers:

1. Hubbell.
2. Pass and Seymour.
3. General Electric.
4. TayMac.
5. Lutron.
6. Leviton.

C. Wall Switches:

1. Provide wall switches for lighting circuits and motor loads under 1/2 HP conforming to NEMA WD; FS W-S-896; AC-general use snap switch with toggle handle, rated 20 amperes and 120-277VAC.

2. Provide switch with gray handle.
3. For exterior applications, provide cast box and weatherproof actuating lever toggle switch cover.

D. Receptacles:

1. Provide convenience and straight-blade receptacles conforming to NEMA WD 1, locking blade receptacles conforming to NEMA WD 5, and convenience receptacle configuration conforming to NEMA WD 1; Type 5-20, gray plastic face.
2. Provide specific-use receptacle configuration conforming to NEMA WD 1 type as indicated on the drawings, and with a brown plastic face.
3. Provide GFCI duplex convenience receptacles with integral ground fault current interrupters and gray plastic face.

E. Wall Plates:

1. Provide type 304 stainless steel oversized (jumbo) interior wall plates.
2. Provide continuous-use rated exterior device cover. Provide cover constructed entirely of UV stabilized high impact polycarbonate material with gasket, stainless steel mounting screws and UL listed for wet location continuous-use. Provide cover equal to TayMac Specification Grade series.
3. Design plates to fit the device or devices on which they are used.

## 2.8 LIGHTING

A. Applicable standards:

1. FS W-F-414: Fixture, Lighting.

B. Interior luminaires and accessories are as shown on the Drawings.

C. Exterior luminaires and accessories:

1. As shown on the Drawings.
2. Enclosures: Complete with gaskets to form weatherproof assembly.
3. Provide low temperature ballasts, with reliable starting to 10ºF.

A. .

## 2.9 ENCLOSED CIRCUIT BREAKERS

A. Applicable standards:

1. FS W-C-375: Circuit Breakers, Molded Case, Branch Circuit and Service.
2. NEMA AB 1-93: Molded Case Circuit Breakers and Molded Case Switches.
3. UL-489: Molded Case Circuit Breakers and Circuit Breaker Enclosures.
4. UL-50: Cabinets and Boxes.
5. NEMA-250: Enclosures for Electrical Equipment.

B. Acceptable manufacturers:

1. General Electric.
2. Square D.
3. Cutler-Hammer.

4. Siemens Energy & Automation.

C. Enclosed Circuit Breakers:

1. Enclosed Molded-Case Circuit Breaker: NEMA AB 1, lockable handle. Handle lockable in OFF position. Provide enclosures type as indicated on Drawings.
2. Provide frame size, trip rating, number of poles, and auxiliary devices as indicated, interrupting capacity rating to meet available fault current, 35,000 RMS symmetrical amperes minimum, with appropriate listing when utilized for switching fluorescent lighting, heating, air-conditioning and refrigeration equipment.
3. Provide shunt-trip where indicated, 120V, 60Hz.
4. Provide interchangeable trip units, on circuit breakers 200 amps and larger, with trip units interchangeable within frame size.

2.10 AUTOMATIC TRANSFER SWITCH (CONTACTOR TYPE)-Furnished by Generator Supplier

A. Applicable standards:

1. UL 1008: Standard for Automatic Transfer Switches.
2. NFPA 70: National Electrical Code.
3. NFPA 99: Essential Electrical Systems for Health Care Facilities.
4. NFPA 110: Emergency and Standby Power Systems.
5. IEEE 446: IEEE Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications.
6. NEMA ICS10-1993: AC Automatic Transfer Switches.

B. Acceptable manufacturers:

1. American Switch Company (ASCO).
2. Russ Electric.
3. GE/Zenith.

C. The following specifications are based on the ACSO 300 series power transfer switch and should be considered as a minimum for features and quality.

D. Provide a service entrance rated, stand-alone automatic transfer switch rated for 120/240, 277/480 volt, 3-phase, 4-wire, wye, 60 Hz. Provide unit enclosures as shown on drawings with NEMA 4X stainless steel as noted on the Drawings.

E. Provide switch as true double throw, mechanically held, electrically operated, utilizing a reliable field proven, single-solenoid operator with contacts easily accessible for inspection and preventive maintenance.

F. Provide 3 pole switch with solid neutral as shown on drawings.

G. Provide amperage and voltage ratings as shown on drawings.

H. Provide the following features:

1. Microprocessor Controls.
2. Optically isolated RS-485 Serial Communication Interface.
3. In-phase Monitor.

4. Selective Load Disconnect.
5. Engine Exerciser.
6. Solid Neutral.
7. Switch Position Lights.
8. Source Availability Lights.
9. Test Switch.
10. Time Delay Bypass Switch.
11. One (1) NO and one (1) NC Contacts Rated 10 amps 250VAC.
12. 60 or 50 Hz Selectable.
13. 3 phase or 1 phase Selectable.
14. Two (2) NO and two (2) NC Auxiliary Contacts.
15. Manual Transfer Option.
16. Strip Heater with Thermostat.
17. Serial Communication Board.
18. Deluxe Exerciser.
19. Time Delay Adjustments:
    a. Override Momentary Normal Outage - 1-3 Seconds.
    b. Transfer to Emergency - 0-5 Minutes.
    c. Override Momentary Emergency Outage - 4 Seconds.
    d. Retransfer to Normal - 1 Second – 30 Minutes.
    e. Unloaded Running Time Cool Down - 5 Minutes.
20. Voltage and Frequency Settings:
    a. Normal Source Voltage:
        1) PU - 90%-95%.
        2) DO - 70%-85%.
    b. Emergency Source Voltage:
        1) PU - 90%.
        2) DO - 75%.
    c. Emergency Source Frequency:
        1) PU - 95%.
        2) DO - 85%.

I. Switch manufacturer shall maintain a full time service center located within 150 miles of job site location for warranty and non-warranty repair.

## 2.11 CONCRETE SUPPORT FOUNDATIONS

A. Install each freestanding unit of electrical equipment on a 4” thick, 3000 PSI wire mesh reinforced concrete pad or curb with 36” clear on front side and 12” clear on all remaining sides, unless otherwise noted on drawings. Provide ¾” chamfer all sides.

## 2.12 MISCELLANEOUS MATERIALS

A. Provide support framing, channel and associated accessories of aluminum conforming to the Drawings other sections of these specifications, except in areas containing chemicals, whereby fiberglass reinforced plastic only shall be utilized.

B. Provide and install equipment racks for panels as shown on the drawings and as described in the specifications, with the following as a minimum:

1. Provide cross members consisting of two (2) horizontal pieces of pre-drilled 1-1/2” x 1-1/2” mounting channel, manufactured by Kindorff.
2. Attach all struts with spring-loaded nuts and associated hardware provided by manufacturer of strut, and specifically designed for this purpose.
3. Use 316 stainless steel stud nuts, manufactured by Kindorff.

4. Support the mounting channel “cross bars” vertically by C-channels, 3” x 2” x 8’.
5. Mount channels a maximum of 24” apart, center-to-center, quantity as required to accommodate equipment.
6. Provide a foundation buried 36” underground and secured with 3000 PSI concrete pad, sized as shown on plans with a minimum of 36” clear walking space in front of control panels and 12” on sides and rear of panel.
7. Provide ¾” chamfer on all concrete edges.

C. Provide 316 stainless steel (bolts, nuts, washers, U-bolts, anchors, threaded rods, etc.) attachment hardware.

## 2.13 LABELING

A. Mark all 480-volt equipment with red laminated plastic nameplates having one-half inch (1/2”) engraved lettering, reading “DANGER 480-VOLTS”. Attach plate to equipment with stainless steel screws.

B. Mark conductors within panelboards with self-sticking label bearing the number corresponding to the circuit number on the drawings. Connect these conductors to corresponding breaker in panel. Mark circuit numbers in outlet boxes only where color-coding is repeated by having two or more conductors of the same color.

C. Mark equipment, switchboards, panelboards, cabinets, transformers, control devices, starters, switches, etc.

D. Labels shall be created by means of black pheonolic material having engraved Micarta letters with white core having ¼” engraved lettering.

E. Provide designations as indicated on the drawings to include:

1. Name of the equipment or equipment that is being served,
2. Power source and circuit of origin along with room location
3. Voltage and number of phases.

F. Attach plates to equipment with stainless steel screws.

G. Mark all junction boxes with the voltages contained internal to it. If multiple power sources are internal to the junction boxes, it shall be labelled “Contains Multiple Power Sources”

H. Panelboards shall contain typed and laminated panel schedules indicating circuit numbers and loads

I. Cable Trays containing conductors rated over 600 volts shall be labelled “DANGER – HIGH VOLTAGE – KEEP AWAY”

# PART 3 – EXECUTION

## 3.1 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.

## 3.2 PREPARATION

A. Coordination:

1. Coordinate as necessary with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
2. Coordinate the installation of electrical items with the schedule for work of other trades to prevent unnecessary delays in the total Work.
3. Where lighting fixtures and other electrical items are shown in conflict with locations of structural members and mechanical or other equipment, provide required supports and wiring to clear the encroachment.

B. Data indicated on the Drawings and in these Specifications are as exact as could be secured, but their absolute accuracy is not warranted. The exact locations, distances, levels, and other conditions will be governed by actual construction and the Drawings and Specifications should be used only for guidance in such regard.

C. Where outlets are not specifically located on the Drawings, locate as determined in the field by the Engineer. Where outlets are installed without such specific direction, relocate as directed by the Engineer and at no additional cost to the Owner.

D. Verify all measurements at the building. No extra compensation will be allowed because of differences between work shown on the Drawings and actual measurements at the site of construction.

E. Branch circuit wiring and arrangement of home runs have been designed for maximum economy consistent with adequate sizing for voltage drops and other considerations. Install the wiring with circuits arranged exactly as shown on the Drawings, except as otherwise approved in advance by the Engineer.

## 3.3 ELECTRICAL SERVICE

A. Verify location of utility transformer pad and install per utility company specifications, providing all materials and labor required for a complete installation. Verify location of utility company secondary delivery point and report any discrepancies to the Engineer immediately.

## 3.4 TRENCHING AND BACKFILLING

A. Perform trenching and backfilling associated with the work of this Section in strict accordance with the provisions of other Sections of these Specifications.

## 3.5 CONDUCTORS

A. Install no conductor smaller than #12 AWG unless otherwise indicated.

B. Provide copper conductors.

C. Provide conductors as shown on the plans or as specified herein.

D. Provide continuous wiring from outlet to outlet, identified by color and marked with size, grade and manufacturer.

E. Provide continuous wiring without joints, through pull boxes.

F. Provide minimum of #10 AWG conductors on branch circuits, which exceed 100’ at 120 volts and 200’ at 277 volts from panel to load center.

G. Terminate #14 AWG stranded conductors where indicated for control, using insulated compression-type spade lugs.

H. Terminate #12 AWG stranded conductors using insulated compression-type spade lugs.

I. Install an equal number of conductors for each phase of a circuit in the same raceway or cable.

J. The conductor lengths for parallel circuits must be made equal.

K. Neatly train and lace all wiring inside boxes, equipment, and panel boards.

L. Connect circuits sharing a common neutral to different phases regardless of the numbering.

M. Provide phase, neutral, and ground conductors as required to accommodate metering installed. Any additional conductors required for meter to function properly shall be installed at the Contractor's expense.

N. Megger testing of medium voltage cable per UL 1072.

3.6 COLOR CODE AND MARKERS

A. Provide color-coding for #12 and #10 conductors as follows:

| | **277/480-Volt** | **120/208(240)-Volt** |
|---|---|---|
| Phase "A" | Brown | Black |
| Phase "B" | Orange | Red |
| Phase "C" | Yellow | Blue |
| Neutral | White with Tracer | White |
| Ground | Green | Green |

B. Mark all conductors #8 and larger and all feeders with plastic tape to match the above color-coding.

C. Provide primary cables with phase code as directed by the Engineer.

3.7 SPLICES, CONNECTIONS, AND TERMINATIONS IN 600V. CONDUCTORS

A. Provide final connections and/or terminations for all wiring indicated on the electrical drawings and in this division of the specifications. Equipment supplied under other divisions of the specifications that require electrical connections under this division shall be provided with Engineer approved wiring and termination diagrams.

B. Splice only in accessible junction boxes.

C. Thoroughly clean wires before installing lugs and connectors.

D. Terminate spare conductors with electrical tape.

3.8 RACEWAYS AND FITTINGS

A. When PVC coated conduit systems are utilized, the raceway manufacturer prior to installation shall certify the Contractor. Submit certification to the Engineer in writing.

B. When PVC coated conduit systems are utilized, provide inspection and certification of the complete raceway installation in writing by an authorized representative of the PVC coated materials supplier.

1. During the construction process, at regular intervals, and prior to any raceway being covered, the representative shall inspect the system until it is confirmed that it meets the manufacturer's intended requirements.
2. Remove and reinstall any portion of the conduit installation that does not meet the intended installation methods at no additional cost to the Owner.

C. Provide certification to insure that all PVC overlapping connections, conduit threading, thread coating, sealing, etc., has been performed in accordance with manufacturer's recommended procedures.

D. Apply thread compound to all field-cut threads prior to installation.

E. In general, follow the raceway installation layout shown on the plans, however, this layout is diagrammatic only, and where changes are necessary due to structural conditions, other apparatus or other causes, make such changes without any additional cost to the Owner.

F. Cut all conduits square using a saw or pipe cutter and de-burr cut ends.

G. Install the conduit to the shoulder of fittings and couplings and fastened securely.

H. Use conduit hubs, or sealing locknuts, for fastening conduit to cast boxes and for fastening conduit to sheet metal boxes in damp or wet locations.

I. No more than the equivalent of three 90-degree bends may be installed between boxes.

J. Use conduit bodies to make sharp changes in direction, as around beams.

K. Use hydraulic one-shot conduit bender or factory elbows for bends in conduit larger than 2" size.

L. Avoid Moisture traps where possible; where moisture traps are unavoidable, there must be a junction box with drain fitting provided at the conduit low point. Use suitable conduit caps to protect installed conduit against entrance of dirt, concrete, plaster, mortar, and moisture.

M. Size all conduits for conductor type installed with ¾" being the minimum size conduit allowed.

N. Arrange conduit to maintain headroom and present a neat appearance.

O. Route any exposed conduit and conduit above accessible ceilings parallel and perpendicular to walls and adjacent piping.

P. Provide at all times a minimum of 6" clearance between conduit and piping and a 12" clearance between conduit and heat sources such as flues, steam pipes, and heating appliances.

Q. Arrange all conduit supports to prevent distortion of alignment by conductor pulling operations.

R. Fasten conduits above finished ceilings using straps, lay-in adjustable hangers, clevis hangers or bolted split stamped hangers.

1. Do not fasten conduit with wire or perforated pipe straps. All wire that was used for temporary conduit support during construction must be removed before conductors are pulled.
2. All conduits must be supported at a maximum distance of 5’ on centers.

S. Group conduits in parallel runs where practical using a conduit rack.

T. Make all underground conduit joints watertight by applying manufacturer’s recommended thread compound. Thread compound must be conductive and be compatible with conduit and conductor-jacket material.

U. Provide suitable pull string or #12 AWG insulated conductor in empty conduit, except sleeves and nipples.

V. Maintain minimum 12” clearance between all conduits containing signal circuits and conduits containing power circuits.

W. Install expansion-deflection joints where conduit crosses building expansion or seismic joints.

X. Where conduit penetrates fire-rated walls and floors, the opening around the conduit must be sealed with UL listed foamed silicone elastomer compound.

Y. Install exposed raceways either parallel or perpendicular to building walls.

Z. Install raceways exposed on walls or free standing perpendicular to the floor.

AA. Install exposed raceways on channel so as to provide a minimum spacing of 1/2” between raceway and the surface to which it is mounted.

BB. Bends:

1. Where emerging from walls, ceilings, floor or concrete slabs, all conduit bends shall be made entirely within the structure (i.e.: the conduit shall emerge perpendicular to the surface and the bend shall be covered).
2. Make all 90-degree conduit turns with factory-bent, rigid galvanized steel, long radius elbows.
3. Utilize rigid galvanized steel, long radius elbows on all 90 degree conduit bends of 2” and larger.

CC. Install no metal conduit in contact with the earth or concrete slab unless protected with PVC coating or two coats of bitumastic coating.

DD. Provide necessary sleeves and chases where conduits pass through floors and walls, and provide other necessary openings and spaces, arranging for in proper time to prevent unnecessary cutting in connection with the Work.

EE. Perform cutting and patching in accordance with the provisions for the original Work.

FF. Refer to NEC for minimum cover of underground conduits.

GG. Sealing Conduit:

1. Install watertight conduit hubs on all conduits terminating in the top or sides of NEMA 3R, 4 or 4X enclosures.
2. Use a sealing locknut having an integral gasket on conduits terminating in the bottom of NEMA 3R, 4 or 4X enclosures.
3. Seal all conduits terminating in NEMA 3R, 4 or 4X enclosures with duct seal.
4. Seal watertight all conduits terminating in NEMA 6 or watertight rated enclosures.
5. Install sealing compound and fiber, per manufacturer's recommendation, in hazardous location conduit sealing fittings. Tighten plugs per manufacturer's recommended torque.

HH. Make motor lead connections and connections to other electrical equipment subject to vibration, or where indicated with flexible weatherproof type steel core conduit with wrapping and cover, factory assembled.

II. Conduit installations in hazardous locations as defined by Article 500 of the NEC must conform to the special requirements of Articles 501, 502, and 503 of the NEC.

JJ. Chapter 9 of the NEC shall apply unless larger raceways are specified.

KK. Ensure all threads are fully installed into fittings, boxes, enclosures and equipment per NEC and UL listing requirements to provide mechanical integrity, grounding and sealing. Provide fittings and adapters to ensure full length of conduit or conduit fitting threads are installed per code and listing requirements.

LL. Liquidtight flexible metal conduit shall be supported and securely fastened within 12 inches of each box, cabinet, conduit body or other conduit body termination and shall be supported and secured at intervals not to exceed 4-1/2 feet. Flexible metal conduit shall not exceed 6 feet in length except for luminaire connections as allowed per the NEC.

MM. Provide plastic threaded type bushings for all conduits terminated in enclosures.

## 3.9 CONDUIT SUPPORTS

A. Seal all ends of non-metallic conduit support with manufacturer's recommended sealer.

B. Provide UL listed vinyl end caps for all ends of strut-type metallic conduit supports.

C. Provide all miscellaneous materials and supports as required by the NEC and these specifications to provide support for conduits, raceways, boxes, fittings and equipment.

## 3.10 GROUNDING AND BONDING

A. Ground and bond the electrical system and motors in accordance with Article 250 of the NEC.

B. Install electric bond around panels, cabinets, pull boxes, enclosures, etc., to incoming and outgoing sub-feed raceways by use of grounding type bushings.

C. Install rod electrodes at locations indicated. Install additional rod electrodes as required to achieve specified resistance to ground.

D. Provide grounding electrode conductor(s) and connect as shown on drawings.

E. Bond together metal siding not attached to grounded structure; bond to ground.

F. Provide separate, insulated, green equipment grounding conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

G. Provide grounding type bushings for conduits 1" or larger and bond to ground bar or lug of enclosure.

H. Bond neutral and ground at service entrance only.

I. Provide exothermic-type weld grounding connections that are buried or otherwise normally inaccessible, and excepting specifically those connections for which access is required for periodic testing.

J. Make each grounding connection strictly in accordance with the manufacturer's written instructions. Failure to follow manufacturer's written instructions shall result in immediate rejection.

K. Welds which have "puffed up" or which show convex surfaces, indicating improper cleaning, are not acceptable. Provide grounding connection devices compatible with the conductor(s) and/or rods being joined.

L. Maximum acceptable resistance to earth ground is 25 Ohms. Provide testing of the service entrance system ground and verify the resistance to earth ground is within the specified requirements. If the existing service entrance ground does not meet the specified requirements, install additional rod electrodes as required to achieve specified resistance to ground.

M. Interface with lightning protection system where applicable.

## 3.11 SURGE SUPRESSION DEVICE (SPD)

A. Factory Installed:

1. Install SPD on the load side of the main circuit breaker.
2. Provide circuit breaker disconnect for SPD as shown on plans.
3. Install SPD in accordance with manufacturer instructions.
4. Minimum lead length 6".
5. Provide a factory installed SPDs in panelboards as shown on the drawings.

## 3.12 OUTLET BOXES

A. Do not install boxes back-to-back in walls. Install the boxes at a minimum of 6" apart except in acoustic-rated walls with a minimum separation of 12".

B.

C. Locate boxes in masonry walls such that only the cutting of the masonry unit corner is required. Coordinate masonry cutting such that neat openings for the boxes can be achieved.

D. Provide knockout closures for unused openings.

E. Support boxes independently of the conduits.

F. Use multiple gang boxes where more than one device is mounted together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems.

G. Install boxes in the walls without damaging wall insulation.

H. Install outlets to locate luminaires as shown on plans.

I. Provide recessed outlet boxes in finished areas; secure boxes to interior wall and partition studs, accurately positioning to allow for surface finish thickness.

J. Use stamped steel stud bridges for flush outlets in hollow stud wall, and adjustable steel channel fasteners for flush ceiling outlet boxes.

K. Align wall mounted outlet boxes for switches, thermostats, and similar devices.

L. Provide cast outlet boxes in locations (exposed to the weather) and indoor wet locations.

M. Size all boxes in strict accordance with Article No. 370 of the NEC, except that no box will be less than the minimum specified.

N. Check the location of all outlets to see that the outlets will clear any new or existing wall fixture, shelving, work tables, sinks, bulletin boards, etc. and the outlet will fit the area intended.

O. Set floor boxes level and flush with finish flooring material. Use cast iron floor boxes for installations in slab on grade.

P. Locate pull and junction boxes above accessible ceilings or in unfinished areas. Support pull and junction boxes independently of conduit.

Q. Install underground boxes as shown on drawings with top of box approximately 2” above finished grade. Install bottom of box over 12” of gravel to allow for adequate drainage.

3.13 CONVENIENCE OUTLETS AND SWITCHES

A. Install wall switches at 48” above the floor level and 6” from edge of door jam on strike side, unless otherwise noted on Drawings.

B. Install wall switches with the OFF position down.

C. Install convenience receptacles at 18” above the floor level or 6” above counter or backsplash.

D. Install convenience receptacles with the grounding pole on top.

E. Install all specific-use receptacles at heights shown on Contract Drawings.

F. Install decorative plates on switch, receptacle, and blank outlets in finished areas using jumbo size plates for outlets installed in masonry walls.

G. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface-mounted outlets.

H. Install devices and wall plates flush and level.

## 3.14 POWER EQUIPMENT

A. Provide power and control wiring for motor starters and safety switches as shown on the Drawings.

B. Connections to miscellaneous building equipment:

1. Wire to, and connect to, all items of building equipment not specifically described but to which electrical power is required.
2. Coordinate as necessary with other trades and suppliers to verify types, numbers, and locations of equipment.

## 3.15 MOUNTING OF CONTROL PANELS AND ELECTRICAL EQUIPMENT

A. Install all equipment per the manufacturer's recommendations and the contract drawings.

B. Install surface-mounted panelboards plumb, in conformance with NEMA PB 1.1.

C. Install disconnect switches with centerline at 48" above finished floor, grade, etc. unless otherwise noted.

D. Secure switchboard assemblies to foundation or floor channels.

E. Secure disconnect switches to channel frames with spring-type fasteners and hardware intended for this specific use where wall mounted, unless otherwise indicated.

F. Mount floor and wall mounted equipment utilizing Type 316 stainless steel anchors and fasteners of the size and number recommended by the manufacturer.

G. Provide necessary hardware to secure the assembly in place.

H. Provide 316 stainless steel fasteners for all other installation types.

I. Inspect switchboards and panel boards for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers, fusible switches, and fuses.

J. Install and check all equipment in accordance with the manufacturer's recommendations.

K. Ensure that equipment mounting pad locations are level to within 0.125 inches per three foot of distance in any direction. Notify Engineer immediately if any discrepancies are found in the field.

L. Ensure that all equipment bus bars are torqued to the manufacturer's recommendations.

M. Assemble all equipment shipping sections, remove all shipping braces and connect all shipping split mechanical and electrical connections.

N. Provide filler plates for unused spaces in panelboards and switchboards.

O. Provide typed circuit directory with protective plastic sleeve secured to inside of panel door for each branch circuit panelboard.

P. Provide Micarta type labels located adjacent to each breaker operator, delineating equipment served for each circuit breaker in all switchboards.

Q. Measure steady state load currents at each switchboard and panelboard feeder. Should the voltage difference measured at the equipment between any two phases exceed 20 percent, rearrange circuits to balance the phase loads within 20 percent. Take care to maintain proper phasing for multi-wire branch circuits.

R. Measure and recording Megger readings phase-to-phase, phase-to-ground, and neutral-to-ground (four wire systems only).

## 3.16 TESTING AND INSPECTION

A. Provide personnel and equipment, make required tests, and secure required approvals from the Engineer and governmental agencies having jurisdiction.

B. Provide written notice to the Engineer adequately in advance of each of the following stages of construction:

1. In the underground condition prior to placing concrete floor slab, when all associated electrical work is in place.
2. When all rough-in is complete, but not covered.
3. At completion of the work of this Section.

C. When material and/or workmanship are found to not comply with the specified requirements, replace items within three days after receipt of notice at no additional cost to the Owner.

D. Provide a qualified field serviceman, representing the manufacturer of each piece of major electrical equipment, to make proper and complete adjustments of all adjustable devices, load switches, etc. after final installation and completion of all field wiring. Verify and approve all connections prior to any initial or test operation of equipment. Submit confirmation in writing by the manufacturer's authorized representative of said services to the Engineer.

## 3.17 HAZARDOUS LOCATIONS

A. Wiring and equipment in hazardous locations, as defined by the NEC, shall conform to the special requirements of the NEC, unless otherwise indicated or specified.

## 3.18 CLEANING AND PAINTING

A. Collect and remove from the premises all debris, scraps and other waste material after completion of work.

B. Tamp and level all trench work.

C. Remove excess dirt and debris, when and as directed by the Engineer.

D. Thoroughly clean all electrical equipment, lighting fixtures, exposed conduit, enclosures and boxes of all foreign materials.

E. Clean any exposed threaded area of raceway of cutting oil and paint with a cold galvanizing compound prior to final finish painting.

## 3.19 ELECTRIC EQUIPMENT BY OTHERS

A. The equipment manufacturer shall furnish all motors for equipment.

B. Verify voltage, dimensions, extent, type, etc. of this and all other such electrical equipment.

C. Furnish and install all electrical supply and control equipment and material required to put all the items in proper operative condition.

D. Refer to other sections of these specifications for verification of other equipment and devices requiring electrical connections, wiring and devices not included in this section.

E. Refer to other drawings for details not indicated on the electrical drawings.

F. Prior to connecting any piece of such equipment, check the nameplate data against the information shown on the drawings and call to the immediate attention of the Engineer any discrepancies discovered.

3.20 PROJECT COMPLETION

A. Test all 600-Volt service entrance and feeder wiring using an instrument, which applies a voltage of approximately 500 volts DC to provide a direct reading of resistance.

B. Perform test on ground system utilizing Fall-Of-Potential method. Meg grounding systems to measure ground resistance, and provide not more than 25 ohms resistance, adding ground rods as necessary to achieve that level.

C. Conduct all tests in presence of Engineer or his representative. Identify and properly record all readings. Submit readings to Engineer for acceptance.

D. Measure voltages as directed by the Engineer and report to him these values.

E. Provide entire system free from all shorts and grounds.

F. Fully comply with local and national codes for equipment bonding and grounding.

G. Test system in the presence of the Engineer and operate to his complete satisfaction in accordance with true intent of plans and specifications. Defray cost of all adjustments necessary to bring system up to standards set forth by Contract Documents at no additional cost.

H. Thoroughly indoctrinate the Owner’s operation and maintenance personnel in the contents of the operations and maintenance manual.

I. On the first day the facility is in operation, for at least eight (8) hours at a time directed by the Engineer, provide a qualified foreman and crew to perform such electrical work as may be required by the Engineer.

3.21 MEASUREMENT AND PAYMENT

A. No separate measurement or direct payment will be made for this work and all costs for same shall be included in the price bid for the work to which it pertains.

END OF SECTION