



# **KW Resort Utilities Corp.**

## **BID DOCUMENTS**

**FOR**  
**6" Interconnecting Forcemain**

**OWNER:**  
**KW Resort Utilities Corp.**  
6630 Front St,  
Key West, Florida 33040

**ENGINEER:**  
**The Weiler Engineering Corporation**  
6805 Overseas Highway  
Marathon, Florida 33050

**SEPTEMBER 2019**

**KW Resort Utilities Corp.  
Key West, Florida  
6" Interconnecting Forcemain College Road**

ADVERTISEMENT FOR BIDS

Sealed Bids for the construction of the **Stock Island Vacuum Sewer Construction** project will be received by **KW Resort Utilities Corp.**, at **6630 Front Street, Key West, Florida 33040**, until **4:00 PM** local time on **October 18, 2019**, at which time the Bids received will be privately opened and read. The Project consists of constructing vacuum sewer infrastructure as detailed in the project drawings and specifications.

Bids will be received for a single prime Contract. Bids shall be on a lumps sum basis.

The Issuing Office for the Bidding Documents is: **KW Resort Utilities Corp., 6630 Front Street, Key West, Florida 33040, Att'n Greg Wright**. Prospective Bidders may examine the Bidding Documents at the Issuing Office on Mondays through Fridays between the hours of **8:00 AM and 4:00 PM**, and may obtain copies of the Bidding Documents from the Issuing Office as described below.

Printed copies of the Bidding Documents may be obtained from the Issuing Office, during the hours indicated above.

Bidding Documents are available as portable document format (PDF files) via email. Alternatively, printed Bidding Documents may be obtained from the Issuing Office either via in-person pick-up or via mail

**A non-mandatory pre-bid conference will be held on Wednesday October 2<sup>nd</sup> 2019 11:00 am at 6630 Front Street, Key West, Florida 33040**

+ + END OF ADVERTISEMENT FOR BIDS + +

# 6" INTERCONNECTING FORCEMAIN

## INSTRUCTIONS TO BIDDERS

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## **ARTICLE 1 – DEFINED TERMS**

1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:

A. *Issuing Office* – The office from which the Bidding Documents are to be issued.

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

2.01 Complete sets of the Bidding Documents may be obtained from the Issuing Office in the number and format stated in the advertisement or invitation to bid.

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

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

## **ARTICLE 3 – QUALIFICATIONS OF BIDDERS**

3.01 To demonstrate Bidder's qualifications to perform the Work, Bidder shall submit with its Bid (a) written evidence establishing its qualifications such as financial data, previous experience, and present commitments, and (b) the following additional information:

A. Evidence of Bidder's authority to do business in the state where the Project is located.

B. Bidder's state or other contractor license number, if applicable.

C. Subcontractor and Supplier qualification information; coordinate with provisions of Article 12 of these Instructions, "Subcontractors, Suppliers, and Others."

3.02 A Bidder's failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Contract.

3.03 No requirement in this Article 3 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.

3.04 Bidder is advised to carefully review those portions of the Bid Form requiring Bidder's representations and certifications.

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

4.01 *Site and Other Areas*

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

4.02 *Existing Site Conditions*

A. Subsurface and Physical Conditions; Hazardous Environmental Conditions

1. The Supplementary Conditions identify:
    - a. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site.
    - b. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).
  2. If the Supplementary Conditions do not identify Technical Data, the default definition of Technical Data set forth in Article 1 of the General Conditions will apply.
- B. Underground Facilities: Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or adjacent to the Site are set forth in the Contract Documents and are based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, including Owner, or others.
- C. Adequacy of Data: Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions, and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated subsurface or physical conditions appear in Paragraphs 5.03, 5.04, and 5.05 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work, appear in Paragraph 5.06 of the General Conditions.

#### 4.03 *Site Visit and Testing by Bidders*

- A. Bidder shall conduct the required Site visit during normal working hours, and shall not disturb any ongoing operations at the Site. Site visits are to be conducted by appointment only. Contact the Greg Wright at KW Resort Utilities Corp. to coordinate a site visit.
- B. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions.
- C. On request, and to the extent Owner has control over the Site, and schedule permitting, the Owner will provide Bidder access to the Site to conduct such additional examinations, investigations, explorations, tests, and studies as Bidder deems necessary for preparing and submitting a successful Bid. Owner will not have any obligation to grant such access if doing so is not practical because of existing operations, security or safety concerns, or restraints on Owner's authority regarding the Site.
- D. Bidder shall comply with all applicable Laws and Regulations regarding excavation and location of utilities, obtain all permits, and comply with all terms and conditions established by Owner or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs.
- E. Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.

#### 4.04 *Owner's Safety Program*

- A. Site visits and work at the Site may be governed by an Owner safety program. As the General Conditions indicate, if an Owner safety program exists, it will be noted in the Supplementary Conditions.

#### 4.05 *Other Work at the Site*

- A. Reference is made to Article 8 of the Supplementary Conditions for the identification of the general nature of other work of which Owner is aware (if any) that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) and relates to the Work contemplated by these Bidding Documents. If Owner is party to a written contract for such other work, then on request, Owner will provide to each Bidder access to examine such contracts (other than portions thereof related to price and other confidential matters), if any.

### **ARTICLE 5 – BIDDER’S REPRESENTATIONS**

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

- A. examine and carefully study the Bidding Documents, and any data and reference items identified in the Bidding Documents;
- B. visit the Site, conduct a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfy itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;
- C. become familiar with and satisfy itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work;
- D. consider the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; and the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder’s safety precautions and programs;
- E. agree, based on the information and observations referred to in the preceding paragraph, that at the time of submitting its Bid no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents;
- F. 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;
- G. promptly give Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder;
- H. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work; and
- I. agree that the submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

## **ARTICLE 6 – PRE-BID CONFERENCE**

6.01 A pre-Bid conference will be held October 2<sup>nd</sup> 2019 at 11:00 am at 6630 Front Street, Key West, Florida 33040. Representatives of Owner and Engineer will be available to discuss the Project with Bidders by appointment. Bidders are encouraged to schedule such a meeting. Owner will transmit to all prospective Bidders of record such Addenda as Engineer considers necessary in response to questions arising at the meetings. Oral statements may not be relied upon and will not be binding or legally effective.

## **ARTICLE 7 – INTERPRETATIONS AND ADDENDA**

7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to Owner in writing. Interpretations or clarifications considered necessary by Owner in response to such questions will be issued by Addenda delivered to all parties recorded as having received the Bidding Documents. Questions received less than seven days prior to the date for opening of Bids may not be answered. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

7.02 Addenda may be issued to clarify, correct, supplement, or change the Bidding Documents.

## **ARTICLE 8 – BID SECURITY**

8.01 A Bid Security will not be required.

## **ARTICLE 9 – CONTRACT TIMES**

9.01 The number of days within which, or the dates by which the Work is to be substantially completed, and completed and ready for final payment, are set forth in the Agreement.

## **ARTICLE 10 – LIQUIDATED DAMAGES**

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

## **ARTICLE 11 – SUBSTITUTE AND “OR-EQUAL” ITEMS**

11.01 The Contract for the Work, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration during the bidding and Contract award process of possible substitute or “or-equal” items. In cases in which the Contract allows the Contractor to request that Engineer authorize the use of a substitute or “or-equal” item of material or equipment, application for such acceptance may not be made to and will not be considered by Engineer until after the Effective Date of the Contract.

11.02 All prices that Bidder sets forth in its Bid shall be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of “or-equal” or substitution requests are made at Bidder’s sole risk.

## **ARTICLE 12 – SUBCONTRACTORS, SUPPLIERS, AND OTHERS**

12.01 A Bidder shall be prepared to retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of the Work if required by the Bidding Documents (most commonly

in the Specifications) to do so. If a prospective Bidder objects to retaining any such Subcontractor, Supplier, or other individual or entity, and the concern is not relieved by an Addendum, then the prospective Bidder should refrain from submitting a Bid.

12.02 Subsequent to the submittal of the Bid, Owner may not require the Successful Bidder or Contractor to retain any Subcontractor, Supplier, or other individual or entity against which Contractor has reasonable objection.

12.03 The apparent Successful Bidder, and any other Bidder so requested, shall within five days after Bid opening, submit to Owner a list of the Subcontractors or Suppliers proposed for the following portions of the Work: Electrical, Plumbing, Asphalt and Testing.

If requested by Owner, 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, or other individual or entity. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute, in which case apparent Successful Bidder shall submit a substitute, Bidder's Bid price will be increased (or decreased) by the difference in cost occasioned by such substitution, and Owner may consider such price adjustment in evaluating Bids and making the Contract award.

12.04 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers, or other individuals or entities. Declining to make requested substitutions will 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 subsequent revocation of such acceptance as provided in Paragraph 7.06 of the General Conditions.

### **ARTICLE 13 – PREPARATION OF BID**

13.01 The Bid Form is included with the Bidding Documents.

A. All blanks on the Bid Form shall be completed in ink and the Bid Form signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form. A Bid price shall be indicated for each section, Bid item, alternate, adjustment unit price item, and unit price item listed therein.

B. If the Bid Form expressly indicates that submitting pricing on a specific alternate item is optional, and Bidder elects to not furnish pricing for such optional alternate item, then Bidder may enter the words "No Bid" or "Not Applicable."

13.02 A Bid by a corporation shall be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate address and state of incorporation shall be shown.

13.03 A Bid by a partnership shall be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The partnership's address for receiving notices shall be shown.

13.04 A Bid by a limited liability company shall be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the firm's address for receiving notices shall be shown.

13.05 A Bid by an individual shall show the Bidder's name and address for receiving notices.



- 13.06 A Bid by a joint venture shall be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The joint venture's address for receiving notices shall be shown.
- 13.07 All names shall be printed in ink below the signatures.
- 13.08 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid Form.
- 13.09 Postal and e-mail addresses and telephone number for communications regarding the Bid shall be shown.
- 13.10 The Bid shall contain evidence of Bidder's authority and qualification to do business in the state where the Project is located, or Bidder shall covenant in writing to obtain such authority and qualification prior to award of the Contract and attach such covenant to the Bid. Bidder's state contractor license number, if any, shall also be shown on the Bid Form.

#### **ARTICLE 14 – BASIS OF BID**

##### **14.01 *Lump Sum***

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

##### **14.02 *Unit Price***

- A. Bidders shall submit a Bid on a unit price basis for each item of Work listed in the unit price section of the Bid Form.
- B. The "Bid Price" (sometimes referred to as the extended price) for each unit price Bid item will be the product of the "Estimated Quantity" (which Owner or its representative has set forth in the Bid Form) for the item and the corresponding "Bid Unit Price" offered by the Bidder. The total of all unit price Bid items will be the sum of these "Bid Prices"; such total will be used by Owner for Bid comparison purposes. The final quantities and Contract Price will be determined in accordance with Paragraph 13.03 of the General Conditions.
- C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

##### **14.03 *Allowances***

- A. For cash allowances the Bid price shall include such amounts as the Bidder deems proper for Contractor's overhead, costs, profit, and other expenses on account of cash allowances, if any, named in the Contract Documents, in accordance with Paragraph 13.02.B of the General Conditions.

#### **ARTICLE 15 – SUBMITTAL OF BID**

- 15.01 With each copy of the Bidding Documents, a Bidder is furnished one separate unbound copy of the Bid Form, and, if required, the Bid Bond Form. The unbound copy of the Bid Form is to be completed and submitted with the other documents required to be submitted under the terms of Article 7 of the Bid Form.
- 15.02 A Bid shall be received no later than the date and time specified by the Engineer and shall be enclosed in a plainly marked package with the Project title, the name and address of Bidder, and shall be accompanied other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate package plainly

marked on the outside with the notation "BID ENCLOSED." A mailed Bid shall be addressed to KW Resort Utilities Corp., 6630 Front Street, Key West, Florida 33040 .

- 15.03 Bids received after the date and time prescribed for the opening of bids, or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to the Bidder unopened.

#### **ARTICLE 16 – MODIFICATION AND WITHDRAWAL OF BID**

- 16.01 A Bid may be withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.
- 16.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 16.01 and submit a new Bid prior to the date and time for the opening of Bids.
- 16.03 If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, that Bidder will be disqualified from further bidding on the Work.

#### **ARTICLE 17 – OPENING OF BIDS**

- 17.01 Bids will be opened privately.

#### **ARTICLE 18 – BIDS TO REMAIN SUBJECT TO ACCEPTANCE**

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

#### **ARTICLE 19 – EVALUATION OF BIDS AND AWARD OF CONTRACT**

- 19.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible. If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of the Bid, then the Owner will reject the Bid as nonresponsive; provided that Owner also reserves the right to waive all minor informalities not involving price, time, or changes in the Work.
- 19.02 If Owner awards the contract for the Work, such award shall be to the responsible Bidder deemed to be in the best interest of the Owner, based solely on the Owners discretion.
- 19.03 Evaluation of Bids
- A. In evaluating Bids, Owner will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.

- B. For the determination of the apparent low Bidder when unit price bids are submitted, Bids will be compared on the basis of the total of the products of the estimated quantity of each item and unit price Bid for that item, together with any lump sum items.
- 19.04 In evaluating whether a Bidder is responsible, Owner will consider the qualifications of the Bidder and may consider the qualifications and experience of Subcontractors and Suppliers proposed for those portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.
- 19.05 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders and any proposed Subcontractors or Suppliers.

#### **ARTICLE 20 – BONDS AND INSURANCE**

- 20.01 Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner’s requirements as to performance and payment bonds and insurance. Payment and Performance Bonds will not be required for this project.

#### **ARTICLE 21 – SIGNING OF AGREEMENT**

- 21.01 When Owner issues a Notice of Award to the Successful Bidder, it shall be accompanied by the unexecuted counterparts of the Agreement along with the other Contract Documents as identified in the Agreement. Within 15 days thereafter, Successful Bidder shall execute and deliver the required number of counterparts of the Agreement (and any bonds and insurance documentation required to be delivered by the Contract Documents) to Owner. Within ten days thereafter, Owner shall deliver one fully executed counterpart of the Agreement to Successful Bidder, together with printed and electronic copies of the Contract Documents as stated in

**BID FORM**

# **KWRU 6" Interconnecting Forcemain**

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**ARTICLE 1 – BID RECIPIENT**

1.01 This Bid is submitted to:

KW Resort Utilities Corp.  
6630 Front Street  
Key West, Florida 33040

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

**ARTICLE 2 – BIDDER’S ACKNOWLEDGEMENTS**

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

**ARTICLE 3 – BIDDER’S REPRESENTATIONS**

3.01 In submitting this Bid, Bidder represents that:

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

<u>Addendum No.</u>	<u>Addendum, Date</u>
_____	_____
_____	_____
_____	_____
_____	_____

- B. Bidder has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfied itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- C. Bidder is familiar with and has satisfied itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work.
- D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions (if any) at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.
- E. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and

observations obtained from visits to the Site; the Bidding Documents; and any Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs.

- F. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.
- G. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and confirms that the written resolution thereof by Engineer is acceptable to Bidder.
- I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work.
- J. The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

#### **ARTICLE 4 – BIDDER'S CERTIFICATION**

4.01 Bidder certifies that:

- A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and
- D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:
  - 1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process;
  - 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
  - 3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and
  - 4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

**ARTICLE 5 – BASIS OF BID**

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

Item No.	Description	Unit	Estimated Quantity	Bid Unit Price	Bid Price
<b>1.00</b>	<b>General</b>				
1.01	Mobilization	LS	1		
1.02	Bonds, Insurance, Taxes, etc.	LS	1		
<b>2.00</b>	<b>6” Interconnecting FM</b>				
2.01	Erosion Control (BMPs)	LS	1		
2.02	Maintenance of Traffic	LS	1		
2.03	6” SDR 26 or C900 Pressure Class pipe	LS	±600		
2.04	6” Valves, Valve box, Collar, etc..	EA	2		
2.05	6” Hot Tap w/ Tapping Sleeve	EA	1		
2.06	4” Hot Tap w/ Tapping Sleeve	EA	1		
2.07	Restoration Work, including asphalt, sod, stone etc..	LS	1		
2.08	As-Built Survey by FL Licensed Surveyor	LS	1		
<b>Total of All Unit Price Bid Items</b>					\$

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

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**Total of Unit Price Bids = Total Bid Price** \$ \_\_\_\_\_

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**ARTICLE 6 – TIME OF COMPLETION**

6.01 Bidder agrees that the Work will be substantially complete within **30** calendar days after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the



General Conditions, and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within 60 calendar days after the date when the Contract Times commence to run.

6.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

**ARTICLE 7 – ATTACHMENTS TO THIS BID**

7.01 The following documents are submitted with and made a condition of this Bid:

- A. List of Proposed Subcontractors;
- B. List of Project References;
- C. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such license within the time for acceptance of Bids;
- D. Contractor’s License No.:                      ;
- E. Required Bidder Qualification Statement with supporting data

**ARTICLE 8 – DEFINED TERMS**

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

**ARTICLE 9 – BID SUBMITTAL**

BIDDER: *[Indicate correct name of bidding entity]*

\_\_\_\_\_

By:

*[Signature]* \_\_\_\_\_

*[Printed name]* \_\_\_\_\_

*(If Bidder is a corporation, a limited liability company, a partnership, or a joint venture, attach evidence of authority to sign.)*

Attest:

*[Signature]* \_\_\_\_\_

*[Printed name]* \_\_\_\_\_

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

Submittal Date: \_\_\_\_\_

Address for giving notices:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

---

Telephone Number: \_\_\_\_\_

Fax Number: \_\_\_\_\_

Contact Name and e-mail address: \_\_\_\_\_

\_\_\_\_\_

Bidder's License No.: \_\_\_\_\_

*(where applicable)*



requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):

1. Substantial Completion: Contractor shall pay Owner \$500 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified in Paragraph 4.02.A above for Substantial Completion until the Work is substantially complete.
2. Completion of Remaining Work: After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner \$500 for each day that expires after such time until the Work is completed and ready for final payment.
3. Liquidated damages for failing to timely attain Substantial Completion and final completion are not additive and will not be imposed concurrently.

---

## ARTICLE 5 – CONTRACT PRICE

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents the amounts that follow, subject to adjustment under the Contract:

- A. For all Work other than Unit Price Work, a lump sum of: \$                    .

All specific cash allowances are included in the above price in accordance with Paragraph 13.02 of the General Conditions.

## ARTICLE 6 – PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

- A. Contractor shall submit Applications for Payment in accordance with Article 15 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

6.02 *Progress Payments; Retainage*

- A. Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment on or about the 30th day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured as the percentage completion of the Work as determined by the Engineer.

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract
  - a. 90 percent of Work completed (with the balance being retainage). If the Work has been 50 percent completed as determined by Engineer, and if the character and progress of the Work have been satisfactory to Owner and Engineer, then as long as the character and progress of the Work remain satisfactory to Owner and Engineer, there will be no additional retainage; and
  - b. 90 percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).

- B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 100 percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 15.01.E of the General Conditions, and less 200 percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.

6.03 *Final Payment*

- A. Upon final completion and acceptance of the Work in accordance with Paragraph 15.06 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 15.06.

**ARTICLE 7 – INTEREST**

- 7.01 All amounts not paid when due shall bear interest at the rate of 1 percent per annum.

**ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS**

- 8.01 In order to induce Owner to enter into this Contract, Contractor makes the following representations:
- A. Contractor has examined and carefully studied the Contract Documents, and any data and reference items identified in the Contract Documents.
  - B. Contractor has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
  - C. Contractor is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.
  - D. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (3) Contractor's safety precautions and programs.
  - E. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
  - F. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.
  - G. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
  - H. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
  - I. Contractor's entry into this Contract constitutes an incontrovertible representation by Contractor that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

## **ARTICLE 9 – CONTRACT DOCUMENTS**

### **9.01** *Contents*

- A. The Contract Documents consist of the following:
  - 1. This Agreement (pages 1 to 7, inclusive).
  - 2. General Conditions (pages i to 65, inclusive).
  - 3. Drawings (not attached but incorporated by reference) consisting of 11 sheets.
  - 4. Exhibits to this Agreement (enumerated as follows):
    - a. Contractor's Bid (pages    to   , inclusive).
  - 5. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
    - a. Notice to Proceed.
    - b. Work Change Directives.
    - c. Change Orders.
    - d. Field Orders.
- B. The documents listed in Paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in this Article 9.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in the General Conditions.

## **ARTICLE 10 – MISCELLANEOUS**

### **10.01** *Terms*

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

### **10.02** *Assignment of Contract*

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

### **10.03** *Successors and Assigns*

- A. 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.

#### 10.04 *Severability*

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

#### 10.05 *Contractor's Certifications*

- A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 10.05:
  - 1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process or in the Contract execution;
  - 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
  - 3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and
  - 4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement.

This Agreement will be effective on  (which is the Effective Date of the Contract).

1.

OWNER: KW Resort Utilities Corp.

CONTRACTOR: .

By: Christopher A. Johnson

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

Title: President

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

*(If Contractor is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)*

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

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

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

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

Address for giving notices:

Address for giving notices:

KW Resort Utilities Corp

\_\_\_\_\_

6630 Front Street

\_\_\_\_\_

Key West, Florida 33040

\_\_\_\_\_

License No.: \_\_\_\_\_

*(where applicable)*





**CERTIFICATE OF SUBSTANTIAL COMPLETION**

Owner: KW Resort Utilities Corp.	Owner's Contract No.:
Contractor:	Contractor's Project No.:
Engineer: Weiler Engineering	Engineer's Project No.: 18013.017
Project: KWRU 6" Interconnecting Forcemain	Contract Name:

**This [preliminary] [final] Certificate of Substantial Completion applies to:**

- All Work  The following specified portions of the Work:

**Date of Substantial Completion**

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Work or portion thereof designated above is hereby established, subject to the provisions of the Contract pertaining to Substantial Completion. The date of Substantial Completion in the final Certificate of Substantial Completion marks the commencement of the contractual correction period and applicable warranties required by the Contract.

A punch list of items to be completed or corrected is attached to this Certificate. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance, and warranties upon Owner's use or occupancy of the Work shall be as provided in the Contract, except as amended as follows:

Amendments to Owner's responsibilities:  None  
 As follows

Amendments to Contractor's responsibilities:  None  
 As follows:

The following documents are attached to and made a part of this Certificate: *[punch list; others]*

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

<b>EXECUTED BY ENGINEER:</b>	<b>RECEIVED:</b>	<b>RECEIVED:</b>
By: _____ (Authorized signature)	By: _____ Owner (Authorized Signature)	By: _____ Contractor (Authorized Signature)
Title: _____	Title: _____	Title: _____
Date: _____	Date: _____	Date: _____

**NOTICE OF ACCEPTABILITY OF WORK**

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**PROJECT:** KWRU 6" Interconnecting Forcemain

**OWNER:** KW Resort Utilities Corp.

**CONTRACTOR:**

**OWNER'S CONSTRUCTION CONTRACT IDENTIFICATION:**

**EFFECTIVE DATE OF THE CONSTRUCTION CONTRACT:**

**ENGINEER:** Weiler Engineering

**NOTICE DATE:**

---

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**To:** \_\_\_\_\_  
**Owner**

**And To:** \_\_\_\_\_  
**Contractor**

**From:** \_\_\_\_\_  
**Engineer**

The Engineer hereby gives notice to the above Owner and Contractor that Engineer has recommended final payment of Contractor, and that the Work furnished and performed by Contractor under the above Construction Contract is acceptable, expressly subject to the provisions of the related Contract Documents, the Agreement between Owner and Engineer for Professional Services dated \_\_\_\_\_, and the following terms and conditions of this Notice:

**CONDITIONS OF NOTICE OF ACCEPTABILITY OF WORK**

The Notice of Acceptability of Work ("Notice") is expressly made subject to the following terms and conditions to which all those who receive said Notice and rely thereon agree:

1. This Notice is given with the skill and care ordinarily used by members of the engineering profession practicing under similar conditions at the same time and in the same locality.
2. This Notice reflects and is an expression of the Engineer's professional opinion.
3. This Notice is given as to the best of Engineer's knowledge, information, and belief as of the Notice Date.

4. This Notice is based entirely on and expressly limited by the scope of services Engineer has been employed by Owner to perform or furnish during construction of the Project (including observation of the Contractor's work) under Engineer's Agreement with Owner, and applies only to facts that are within Engineer's knowledge or could reasonably have been ascertained by Engineer as a result of carrying out the responsibilities specifically assigned to Engineer under such Agreement.
5. This Notice is not a guarantee or warranty of Contractor's performance under the Construction Contract, an acceptance of Work that is not in accordance with the related Contract Documents, including but not limited to defective Work discovered after final inspection, nor an assumption of responsibility for any failure of Contractor to furnish and perform the Work thereunder in accordance with the Construction Contract Documents, or to otherwise comply with the Construction Contract Documents or the terms of any special guarantees specified therein.
6. This Notice does not relieve Contractor of any surviving obligations under the Construction Contract, and is subject to Owner's reservations of rights with respect to completion and final payment.

7.

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

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

Dated: \_\_\_\_\_

**C-700**  
**STANDARD GENERAL CONDITIONS OF THE**  
**CONSTRUCTION CONTRACT**

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## ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

### 1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
  2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.
  3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
  4. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
  5. *Bidder*—An individual or entity that submits a Bid to Owner.
  6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.
  7. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.
  8. *Change Order*—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.
  9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.
  10. *Claim*—(a) A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein: seeking an adjustment of Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract; or (b) a demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal; or seeking resolution of a contractual issue that Engineer

has declined to address. A demand for money or services by a third party is not a Claim.

11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. (“CERCLA”); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§5101 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq. (“RCRA”); (d) the Toxic Substances Control Act, 15 U.S.C. §§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other federal, state, or local statute, law, rule, regulation, ordinance, resolution, code, order, or decree regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.
12. *Contract*—The entire and integrated written contract between the Owner and Contractor concerning the Work.
13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.
14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents. .
15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.
16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.
17. *Cost of the Work*—See Paragraph 13.01 for definition.
18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.
19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.
20. *Engineer*—The individual or entity named as such in the Agreement.
21. *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.
22. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated in the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, does not establish a Hazardous Environmental Condition.
23. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

24. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
25. *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.
26. *Notice of Award*—The written notice by Owner to a Bidder of Owner’s acceptance of the Bid.
27. *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.
28. *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.
29. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor’s plan to accomplish the Work within the Contract Times.
30. *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.
31. *Project Manual*—The written documents prepared for, or made available for, procuring and constructing the Work, including but not limited to the Bidding Documents or other construction procurement documents, geotechnical and existing conditions information, the Agreement, bond forms, General Conditions, Supplementary Conditions, and Specifications. The contents of the Project Manual may be bound in one or more volumes.
32. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative or “RPR” includes any assistants or field staff of Resident Project Representative.
33. *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.
34. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer’s review of the submittals and the performance of related construction activities.
35. *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.
36. *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.
37. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands furnished by Owner which are designated for the use of Contractor.

38. *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.
39. *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.
40. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.
41. *Successful Bidder*—The Bidder whose Bid the Owner accepts, and to which the Owner makes an award of contract, subject to stated conditions.
42. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
43. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.
44. *Technical Data*—Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (a) subsurface conditions at the Site, or physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) or (b) Hazardous Environmental Conditions at the Site. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then the data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made available to Contractor are hereby defined as Technical Data with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06.
45. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including but not limited to those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, fiber optic transmissions, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
46. *Unit Price Work*—Work to be paid for on the basis of unit prices.
47. *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.
48. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

## 1.02 Terminology

- A. The words and terms discussed in the following paragraphs are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *Intent of Certain Terms or Adjectives:*
1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.
- C. *Day:*
1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. *Defective:*
1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
    - a. does not conform to the Contract Documents; or
    - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
    - c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or 15.04).
- E. *Furnish, Install, Perform, Provide:*
1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
  2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
  3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
  4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four

words “furnish,” “install,” “perform,” or “provide,” then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.

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

## **ARTICLE 2 – PRELIMINARY MATTERS**

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

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

### **2.02 *Copies of Documents***

- A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.
- B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

### **2.03 *Before Starting Construction***

- A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise specifically required by the Contract Documents), Contractor shall submit to Engineer for timely review:
  - 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;
  - 2. a preliminary Schedule of Submittals; and
  - 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

#### 2.04 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

#### 2.05 *Initial Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.03.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.
  - 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
  - 2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
  - 3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.

#### 2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may transmit, and shall accept, Project-related correspondence, text, data, documents, drawings, information, and graphics, including but not limited to Shop Drawings and other submittals, in electronic media or digital format, either directly, or through access to a secure Project website.
- B. If the Contract does not establish protocols for electronic or digital transmittals, then Owner, Engineer, and Contractor shall jointly develop such protocols.
- C. When transmitting items in electronic media or digital format, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the items, or from those established in applicable transmittal protocols.



## ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, REUSE

### 3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents.
- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic or digital versions of the Contract Documents (including any printed copies derived from such electronic or digital versions) and the printed record version, the printed record version shall govern.
- D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.
- E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.

### 3.02 *Reference Standards*

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

### 3.03 *Reporting and Resolving Discrepancies*

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

2. *Contractor's Review of Contract Documents:* If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.
  3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.
- B. *Resolving Discrepancies:*
1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:
    - a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or
    - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

### 3.04 *Requirements of the Contract Documents*

- A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work thereunder.
- B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.
- C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly give written notice to Owner and Contractor that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

### 3.05 *Reuse of Documents*

- A. Contractor and its Subcontractors and Suppliers shall not:
  - 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or
  - 2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

## **ARTICLE 4 – COMMENCEMENT AND PROGRESS OF THE WORK**

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

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

### 4.02 *Starting the Work*

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

### 4.03 *Reference Points*

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

### 4.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.
  - 1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.
  - 2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 11.

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

#### 4.05 *Delays in Contractor's Progress*

- A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Times and Contract Price. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.
- C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:
  - 1. severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;
  - 2. abnormal weather conditions;
  - 3. acts or failures to act of utility owners (other than those performing other work at or adjacent to the Site by arrangement with the Owner, as contemplated in Article 8); and
  - 4. acts of war or terrorism.
- D. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5.
- E. Paragraph 8.03 governs delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.
- F. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor.
- G. Contractor must submit any Change Proposal seeking an adjustment in Contract Price or Contract Times under this paragraph within 30 days of the commencement of the delaying, disrupting, or interfering event.

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

### 5.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.
- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

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

- A. *Limitation on Use of Site and Other Areas:*
  - 1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.
  - 2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.12, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or at law; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.
- B. *Removal of Debris During Performance of the Work:* During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste

materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

- C. *Cleaning*: Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.
- D. *Loading of Structures*: Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent structures or land to stresses or pressures that will endanger them.

#### 5.03 *Subsurface and Physical Conditions*

- A. *Reports and Drawings*: The Supplementary Conditions identify:
  - 1. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site;
  - 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities); and
  - 3. Technical Data contained in such reports and drawings.
- B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:
  - 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
  - 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
  - 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

#### 5.04 *Differing Subsurface or Physical Conditions*

- A. *Notice by Contractor*: If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site either:
  - 1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate; or
  - 2. is of such a nature as to require a change in the Drawings or Specifications; or
  - 3. differs materially from that shown or indicated in the Contract Documents; or

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

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

- B. *Engineer's Review:* After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine the necessity of Owner's obtaining additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A above; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- C. *Owner's Statement to Contractor Regarding Site Condition:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.
- D. *Possible Price and Times Adjustments:*
  1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, or both, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
    - a. such condition must fall within any one or more of the categories described in Paragraph 5.04.A;
    - b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,
    - c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
  2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
    - a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise; or
    - b. the existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study

of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or

- c. Contractor failed to give the written notice as required by Paragraph 5.04.A.
- 3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
- 4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.

#### 5.05 *Underground Facilities*

- A. *Contractor's Responsibilities:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or adjacent to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:
  - 1. Owner and Engineer do not warrant or guarantee the accuracy or completeness of any such information or data provided by others; and
  - 2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
    - a. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
    - b. locating all Underground Facilities shown or indicated in the Contract Documents as being at the Site;
    - c. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
    - d. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.
- B. *Notice by Contractor:* If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.
- C. *Engineer's Review:* Engineer will promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the Underground Facility in question; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and advise Owner in writing of Engineer's findings, conclusions, and



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

- D. *Owner's Statement to Contractor Regarding Underground Facility:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question, addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.
- E. *Possible Price and Times Adjustments:*
1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, or both, to the extent that any existing Underground Facility at the Site that was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
    - a. Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated the existence or actual location of the Underground Facility in question;
    - b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;
    - c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times; and
    - d. Contractor gave the notice required in Paragraph 5.05.B.
  2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
  3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

5.06 *Hazardous Environmental Conditions at Site*

- A. *Reports and Drawings:* The Supplementary Conditions identify:
1. those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
  2. Technical Data contained in such reports and drawings.
- B. *Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against

Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
  2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
  3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.
- D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.
- E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.
- F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.
- G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off.
- H. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under

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

- I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.I shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

## **ARTICLE 6 – BONDS AND INSURANCE**

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

- A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of all of Contractor's obligations under the Contract. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the Supplementary Conditions, or other specific provisions of the Contract. Contractor shall also furnish such other bonds as are required by the Supplementary Conditions or other specific provisions of the Contract.
- B. All bonds shall be in the form prescribed by the Contract except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (as amended and supplemented) by the Financial Management Service, Surety Bond Branch, U.S.

Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.

- C. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds in the required amounts.
- D. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or its right to do business is terminated in any state or jurisdiction where any part of the Project is located, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the bond and surety requirements above.
- E. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner's termination rights under Article 16.
- F. Upon request, Owner shall provide a copy of the payment bond to any Subcontractor, Supplier, or other person or entity claiming to have furnished labor or materials used in the performance of the Work.

#### 6.02 *Insurance—General Provisions*

- A. Owner and Contractor shall obtain and maintain insurance as required in this Article and in the Supplementary Conditions.
- 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. Contractor shall deliver to Owner, with copies to each named insured and additional insured (as identified in this Article, in the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Contractor has obtained and is maintaining the policies, coverages, and endorsements required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- D. Owner shall deliver to Contractor, with copies to each named insured and additional insured (as identified in this Article, the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Owner has obtained and is maintaining the policies, coverages, and endorsements required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

- E. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, shall not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.
- F. If either party does not purchase or maintain all of 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.
- G. If Contractor has failed to obtain and maintain required insurance, Owner may exclude the Contractor from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 16.
- H. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price shall be adjusted accordingly.
- I. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests.
- J. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner and other individuals and entities in the Contract.

#### 6.03 *Contractor's Insurance*

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

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

applicable professional liability insurance. This insurance shall provide protection against claims arising out of performance of professional design or related services, and caused by a negligent error, omission, or act for which the insured party is legally liable. It shall be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. If such professional design services are performed by a Subcontractor, and not by Contractor itself, then the requirements of this paragraph may be satisfied through the purchasing and maintenance of such insurance by such Subcontractor.

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

#### 6.04 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 6.03, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.
- B. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.

#### 6.05 *Property Insurance*

- A. *Builder's Risk:* Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the full insurable replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:
  1. include the Owner and Contractor as named insureds, and all Subcontractors, and any individuals or entities required by the Supplementary Conditions to be insured under

such builder's risk policy, as insureds or named insureds. For purposes of the remainder of this Paragraph 6.05, Paragraphs 6.06 and 6.07, and any corresponding Supplementary Conditions, the parties required to be insured shall collectively be referred to as "insureds."

2. be written on a builder's risk "all risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire; lightning; windstorm; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; flood; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; water damage (other than that caused by flood); and such other perils or causes of loss as may be specifically required by the Supplementary Conditions. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance may be provided through other insurance policies acceptable to Owner and Contractor.
3. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.
4. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects).
5. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).
6. extend to cover damage or loss to insured property while in transit.
7. allow for partial occupation or use of the Work by Owner, such that those portions of the Work that are not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
8. allow for the waiver of the insurer's subrogation rights, as set forth below.
9. provide primary coverage for all losses and damages caused by the perils or causes of loss covered.
10. not include a co-insurance clause.
11. include an exception for ensuing losses from physical damage or loss with respect to any defective workmanship, design, or materials exclusions.
12. include performance/hot testing and start-up.



13. be maintained in effect, subject to the provisions herein regarding Substantial Completion and partial occupancy or use of the Work by Owner, until the Work is complete.
- B. *Notice of Cancellation or Change*: All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 6.05 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured.
- C. *Deductibles*: The purchaser of any required builder's risk or property insurance shall pay for costs not covered because of the application of a policy deductible.
- D. *Partial Occupancy or Use by Owner*: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide notice of such occupancy or use to the builder's risk insurer. The builder's risk insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy; rather, those portions of the Work that are occupied or used by Owner may come off the builder's risk policy, while those portions of the Work not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
- E. *Additional Insurance*: If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.05, it may do so at Contractor's expense.
- F. *Insurance of Other Property*: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, such as tools, construction equipment, or other personal property owned by Contractor, a Subcontractor, or an employee of Contractor or a Subcontractor, then the entity or individual owning such property item will be responsible for deciding whether to insure it, and if so in what amount.

#### 6.06 *Waiver of Rights*

- A. All policies purchased in accordance with Paragraph 6.05, expressly including the builder's risk policy, shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any insureds thereunder, or against Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all Subcontractors, all individuals or entities identified in the Supplementary Conditions as insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.

- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for:
  - 1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
  - 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 6.06.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them.
- D. Contractor shall be responsible for assuring that the agreement under which a Subcontractor performs a portion of the Work contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by builder's risk insurance and any other property insurance applicable to the Work.

6.07 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of insurance required by Paragraph 6.05 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.
- B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.05 shall distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.
- C. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the money so received applied on account thereof, and the Work and the cost thereof covered by Change Order, if needed.

## **ARTICLE 7 – CONTRACTOR’S RESPONSIBILITIES**

### **7.01 *Supervision and Superintendence***

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

### **7.02 *Labor; Working Hours***

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner’s written consent, which will not be unreasonably withheld.

### **7.03 *Services, Materials, and Equipment***

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

### **7.04 *“Or Equals”***

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or “or equal” item is permitted, Contractor may request that Engineer authorize the use of other items of material or

equipment, or items from other proposed suppliers under the circumstances described below.

1. If Engineer in its sole discretion determines that an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer shall deem it an “or equal” item. For the purposes of this paragraph, a proposed item of material or equipment will be considered functionally equal to an item so named if:
  - a. in the exercise of reasonable judgment Engineer determines that:
    - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
    - 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
    - 3) it has a proven record of performance and availability of responsive service; and
    - 4) it is not objectionable to Owner.
  - b. Contractor certifies that, if approved and incorporated into the Work:
    - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
    - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.
- B. *Contractor’s Expense:* Contractor shall provide all data in support of any proposed “or equal” item at Contractor’s expense.
- C. *Engineer’s Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each “or-equal” request. Engineer may require Contractor to furnish additional data about the proposed “or-equal” item. Engineer will be the sole judge of acceptability. No “or-equal” item will be ordered, furnished, installed, or utilized until Engineer’s review is complete and Engineer determines that the proposed item is an “or-equal”, which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.
- D. *Effect of Engineer’s Determination:* Neither approval nor denial of an “or-equal” request shall result in any change in Contract Price. The Engineer’s denial of an “or-equal” request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents.
- E. *Treatment as a Substitution Request:* If Engineer determines that an item of material or equipment proposed by Contractor does not qualify as an “or-equal” item, Contractor may request that Engineer consider the proposed item as a substitute pursuant to Paragraph 7.05.

#### 7.05 *Substitutes*

- A. Unless the specification or description of an item of material or equipment required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment under the circumstances described below. To the extent

possible such requests shall be made before commencement of related construction at the Site.

1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of material or equipment from anyone other than Contractor.
  2. The requirements for review by Engineer will be as set forth in Paragraph 7.05.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.
  3. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
    - a. shall certify that the proposed substitute item will:
      - 1) perform adequately the functions and achieve the results called for by the general design,
      - 2) be similar in substance to that specified, and
      - 3) be suited to the same use as that specified.
    - b. will state:
      - 1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times,
      - 2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and
      - 3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.
    - c. will identify:
      - 1) all variations of the proposed substitute item from that specified, and
      - 2) available engineering, sales, maintenance, repair, and replacement services.
    - d. shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.
- B. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.

- C. *Special Guarantee*: Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- D. *Reimbursement of Engineer's Cost*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- E. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute at Contractor's expense.
- F. *Effect of Engineer's Determination*: If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.05.D, by timely submittal of a Change Proposal.

7.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner.
- B. Contractor shall retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of designated parts of the Work if required by the Contract to do so.
- C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against which Contractor has reasonable objection.
- D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable, during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within five days.
- E. Owner may require the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors, Suppliers, or other individuals or entities for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor, Supplier, or other individual or entity so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity.
- F. If Owner requires the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, or both, with respect to the

replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.

- G. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.
- H. On a monthly basis Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.
- I. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions.
- J. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors, Suppliers, and all other individuals or entities performing or furnishing any of the Work.
- K. Contractor shall restrict all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed herein.
- L. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- M. All Work performed for Contractor by a Subcontractor or Supplier shall be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer.
- N. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by the particular Subcontractor or Supplier.
- O. Nothing in the Contract Documents:
  - 1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier, or other individual or entity; nor
  - 2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

#### 7.07 *Patent Fees and Royalties*

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

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

7.08 *Permits*

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

7.09 *Taxes*

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

7.10 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It shall not be Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.



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

#### 7.11 *Record Documents*

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

#### 7.12 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:
  - 1. all persons on the Site or who may be affected by the Work;
  - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
  - 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify Owner; the owners of adjacent property, Underground Facilities, and other utilities; and other contractors and utility owners performing work at or adjacent to the Site, when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.
- C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
- D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.

- E. All damage, injury, or loss to any property referred to in Paragraph 7.12.A.2 or 7.12.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- F. Contractor's duties and responsibilities for safety and protection shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 15.06.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).
- G. Contractor's duties and responsibilities for safety and protection shall resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.13 *Safety Representative*

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

7.14 *Hazard Communication Programs*

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

7.15 *Emergencies*

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

7.16 *Shop Drawings, Samples, and Other Submittals*

- A. *Shop Drawing and Sample Submittal Requirements:*
  - 1. Before submitting a Shop Drawing or Sample, Contractor shall have:
    - a. reviewed and coordinated the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
    - b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

- c. determined and verified the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
    - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
  2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that submittal, and that Contractor approves the submittal.
  3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be set forth in a written communication separate from the Shop Drawings or Sample submittal; and, in addition, in the case of Shop Drawings by a specific notation made on each Shop Drawing submitted to Engineer for review and approval of each such variation.
- B. *Submittal Procedures for Shop Drawings and Samples:* Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals. Each submittal will be identified as Engineer may require.
  1. *Shop Drawings:*
    - a. Contractor shall submit the number of copies required in the Specifications.
    - b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.D.
  2. *Samples:*
    - a. Contractor shall submit the number of Samples required in the Specifications.
    - b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 7.16.D.
  3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.
- C. *Other Submittals:* Contractor shall submit other submittals to Engineer in accordance with the accepted Schedule of Submittals, and pursuant to the applicable terms of the Specifications.
- D. *Engineer's Review:*
  1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract

Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction or to safety precautions or programs incident thereto.
3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
4. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will document any such approved variation from the requirements of the Contract Documents in a Field Order.
5. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 7.16.A and B.
6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, shall not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.
7. Neither Engineer's receipt, review, acceptance or approval of a Shop Drawing, Sample, or other submittal shall result in such item becoming a Contract Document.
8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.D.4.

E. *Resubmittal Procedures:*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.
2. Contractor shall furnish required submittals with sufficient information and accuracy to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing a fourth or subsequent submittal of a Shop Drawings, sample, or other item requiring approval, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges.
3. If Contractor requests a change of a previously approved submittal item, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

7.17 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors,

members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on Contractor's warranty and guarantee.

- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
  - 1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
  - 2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
  - 1. observations by Engineer;
  - 2. recommendation by Engineer or payment by Owner of any progress or final payment;
  - 3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
  - 4. use or occupancy of the Work or any part thereof by Owner;
  - 5. any review and approval of a Shop Drawing or Sample submittal;
  - 6. the issuance of a notice of acceptability by Engineer;
  - 7. any inspection, test, or approval by others; or
  - 8. any correction of defective Work by Owner.
- D. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract shall govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

#### 7.18 *Indemnification*

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

indemnification obligation under Paragraph 7.18.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

- C. The indemnification obligations of Contractor under Paragraph 7.18.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
  - 1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
  - 2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

#### 7.19 *Delegation of Professional Design Services*

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

### **ARTICLE 8 – OTHER WORK AT THE SITE**

#### 8.01 *Other Work*

- A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner

may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.

- B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any utility work at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford each other contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.
- D. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 8, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

#### 8.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions 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 at or adjacent to the Site for Owner, the Owner's employees, any other contractor working for Owner, or any utility owner for whom the Owner is responsible causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying,

disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment shall take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract. When applicable, any such equitable adjustment in Contract Price shall be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

- B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due to Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this paragraph.
- C. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due to Contractor.
- D. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

## **ARTICLE 9 – OWNER'S RESPONSIBILITIES**

### **9.01 *Communications to Contractor***

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

### **9.02 *Replacement of Engineer***

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



- 9.03 *Furnish Data*
- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.
- 9.04 *Pay When Due*
- A. Owner shall make payments to Contractor when they are due as provided in the Agreement.
- 9.05 *Lands and Easements; Reports, Tests, and Drawings*
- A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.
- B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.
- C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.
- 9.06 *Insurance*
- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.
- 9.07 *Change Orders*
- A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.
- 9.08 *Inspections, Tests, and Approvals*
- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.
- 9.09 *Limitations on Owner's Responsibilities*
- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- 9.10 *Undisclosed Hazardous Environmental Condition*
- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.
- 9.11 *Evidence of Financial Arrangements*
- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents (including obligations under proposed changes in the Work).
- 9.12 *Safety Programs*
- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.
- B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

## **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 10.08. Particularly, but without limitation, during or as a result of Engineer’s visits or observations of Contractor’s Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor’s means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

### **10.03 *Project Representative***

- A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 10.08. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer’s consultant, agent, or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

### **10.04 *Rejecting Defective Work***

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

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

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

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

10.06 *Determinations for Unit Price Work*

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

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

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

10.08 *Limitations on Engineer's Authority and Responsibilities*

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

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

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

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

E. The limitations upon authority and responsibility set forth in this Paragraph 10.08 shall also apply to the Resident Project Representative, if any.

10.09 *Compliance with Safety Program*

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

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

### 11.01 *Amending and Supplementing Contract Documents*

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

### 11.02 *Owner-Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Such changes shall be supported by Engineer's recommendation, to the extent the change involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters. Such changes may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work shall be performed under the applicable conditions of the

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

11.03 *Unauthorized Changes in the Work*

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

11.04 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment of Contract Price shall comply with the provisions of Article 12.
- B. An adjustment in the Contract Price will be determined as follows:
  - 1. where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03); or
  - 2. where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.04.C.2); or
  - 3. where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.04.C).
- C. *Contractor's Fee*: When applicable, the Contractor's fee for overhead and profit shall be determined as follows:
  - 1. a mutually acceptable fixed fee; or
  - 2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
    - a. for costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee shall be 15 percent;
    - b. for costs incurred under Paragraph 13.01.B.3, the Contractor's fee shall be five percent;
    - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.04.C.2.a and 11.04.C.2.b is that the Contractor's fee shall be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.A.1 and 13.01.A.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 five 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 shall be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the work;

- d. no fee shall be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;
- e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
- f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 11.04.C.2.a through 11.04.C.2.e, inclusive.

#### 11.05 *Change of Contract Times*

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

#### 11.06 *Change Proposals*

- A. Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; appeal an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due; or seek other relief under the Contract. The Change Proposal shall specify any proposed change in Contract Times or Contract Price, or both, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents.
  - 1. *Procedures:* Contractor shall submit each Change Proposal to Engineer promptly (but in no event later than 30 days) after the start of the event giving rise thereto, or after such initial decision. The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal. The supporting data shall be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event. Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal.
  - 2. *Engineer's Action:* Engineer will review each Change Proposal and, within 30 days after receipt of the Contractor's supporting data, either deny the Change Proposal in whole, approve it in whole, or deny it in part and approve it in part. Such actions shall be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.

3. *Binding Decision*: Engineer's decision will be final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- B. *Resolution of Certain Change Proposals*: If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice shall be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

#### 11.07 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders covering:
  1. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;
  2. changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;
  3. changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.02, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters; and
  4. changes in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under Paragraph 11.06, or Article 12.
- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of this Paragraph 11.07, it shall be deemed to be of full force and effect, as if fully executed.

#### 11.08 *Notification to Surety*

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

### **ARTICLE 12 – CLAIMS**

#### 12.01 *Claims*

- A. *Claims Process*: The following disputes between Owner and Contractor shall be submitted to the Claims process set forth in this Article:
  1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;
  2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents; and

3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters.
- B. *Submittal of Claim:* The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim shall rest with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, or both, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.
- C. *Review and Resolution:* The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim shall be stated in writing and submitted to the other party, with a copy to Engineer.
- D. *Mediation:*
1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate shall stay the Claim submittal and response process.
  2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process shall resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process shall resume as of the date of the conclusion of the mediation, as determined by the mediator.
  3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.
- E. *Partial Approval:* If the party receiving a Claim approves the Claim in part and denies it in part, such action shall be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.
- F. *Denial of Claim:* If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim shall be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.
- G. *Final and Binding Results:* If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim shall be incorporated in a Change Order to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.



## ARTICLE 13 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

### 13.01 *Cost of the Work*

- A. *Purposes for Determination of Cost of the Work:* The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:
1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or
  2. To determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.
- B. *Costs Included:* Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 13.01.C, and shall include only the following items:
1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.
  2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
  3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.
  4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.

5. Supplemental costs including the following:
  - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
  - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
  - c. Rentals of all construction equipment and machinery, and the parts thereof, whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
  - d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
  - e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
  - f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 6.05), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.
  - g. The cost of utilities, fuel, and sanitary facilities at the Site.
  - h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.
  - i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.
- C. *Costs Excluded*: The term Cost of the Work shall not include any of the following items:
  1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.

2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
  3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
  4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
  5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.
- D. *Contractor's Fee*: When the Work as a whole is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 11.04.C.
- E. *Documentation*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

### 13.02 Allowances

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

### 13.03 Unit Price Work

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. 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, subject to the provisions of the following paragraph.
- E. Within 30 days of Engineer's written decision under the preceding paragraph, Contractor may submit a Change Proposal, or Owner may file a Claim, seeking an adjustment in the Contract Price if:
  - 1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement;
  - 2. there is no corresponding adjustment with respect to any other item of Work; and
  - 3. Contractor believes that it is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price, and the parties are unable to agree as to the amount of any such increase or decrease.

## **ARTICLE 14 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK**

### **14.01 *Access to Work***

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

### **14.02 *Tests, Inspections, and Approvals***

- A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.
- B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work shall be governed by the provisions of Paragraph 14.05.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

- D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:
1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;
  2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;
  3. by manufacturers of equipment furnished under the Contract Documents;
  4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and
  5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

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

- E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.
- F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering shall be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to cover the same and Engineer had not acted with reasonable promptness in response to such notice.

#### 14.03 *Defective Work*

- A. *Contractor's Obligation:* It is Contractor's obligation to assure that the Work is not defective.
- B. *Engineer's Authority:* Engineer has the authority to determine whether Work is defective, and to reject defective Work.
- C. *Notice of Defects:* Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.
- D. *Correction, or Removal and Replacement:* Promptly after receipt of written notice of defective Work, 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 shall be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

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

#### 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 shall not give rise to any duty on the part of

Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

#### 14.07 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, then Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow 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 on account of Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.
- B. *Applications for Payments:*
  - 1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens, and evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

C. *Review of Applications:*

1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
  - a. the Work has progressed to the point indicated;
  - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and
  - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
  - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or
  - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
  - a. to supervise, direct, or control the Work, or
  - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or



- c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
    - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid on account of the Contract Price, or
    - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
  - 5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.
  - 6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:
    - a. the Work is defective, 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 on account of Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages on account of Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;
    - b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;
    - c. Contractor has failed to provide and maintain required bonds or insurance;
    - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;
    - e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;

- f. the Work is defective, requiring correction or replacement;
  - g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
  - h. the Contract Price has been reduced by Change Orders;
  - i. an event that would constitute a default by Contractor and therefore justify a termination for cause has occurred;
  - j. liquidated damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;
  - k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
  - l. there are other items entitling Owner to a set off against the amount recommended.
2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed shall be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.
  3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 15.01.C.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 seven 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 shall fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the

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

- D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.
- E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.
- F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

#### 15.04 *Partial Use or Occupancy*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:
  - 1. At any time Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through E for that part of the Work.
  - 2. At any time Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
  - 3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial

Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.05 regarding builder's risk or other property insurance.

#### 15.05 *Final Inspection*

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

#### 15.06 *Final Payment*

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

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents (as provided in Paragraph 7.11), and other documents, Contractor may make application for final payment.
2. The final Application for Payment shall be accompanied (except as previously delivered) by:
  - a. all documentation called for in the Contract Documents;
  - b. consent of the surety, if any, to final payment;
  - c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.
  - d. a list of all disputes that Contractor believes are unsettled; and
  - e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

##### B. *Engineer's Review of Application and Acceptance:*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is

satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the Application for Payment to Owner for payment. Such recommendation shall account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to the provisions of Paragraph 15.07. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

- C. *Completion of Work*: The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment.
- D. *Payment Becomes Due*: Thirty days after the presentation to Owner of the final Application for Payment and accompanying documentation, the amount recommended by Engineer (less any further sum Owner is entitled to set off against Engineer's recommendation, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions above with respect to progress payments) will become due and shall be paid by Owner to Contractor.

#### 15.07 *Waiver of Claims*

- A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor. Owner expressly reserves claims and rights arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 15.05, from Contractor's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, from outstanding Claims by Owner, or from Contractor's continuing obligations under the Contract Documents.
- B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted or appealed under the provisions of Article 17.

#### 15.08 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents, or by any specific provision of the Contract Documents), any Work is found to be defective, or if the repair of any damages to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
  - 1. correct the defective repairs to the Site or such other adjacent areas;
  - 2. correct such defective Work;
  - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
  - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting therefrom.

- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others).
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- E. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

## **ARTICLE 16 – SUSPENSION OF WORK AND TERMINATION**

### *16.01 Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension. Any Change Proposal seeking such adjustments shall be submitted no later than 30 days after the date fixed for resumption of Work.

### *16.02 Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:
  1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule);
  2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;
  3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or
  4. Contractor's repeated disregard of the authority of Owner or Engineer.
- B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) ten days written notice that Owner is considering a declaration that Contractor is in default and termination of the contract, Owner may proceed to:
  1. declare Contractor to be in default, and give Contractor (and any surety) notice that the Contract is terminated; and

2. enforce the rights available to Owner under any applicable performance bond.
- C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.
- D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within seven days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.
- E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.
- F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.
- G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond shall govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

#### 16.03 *Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
  1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
  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 on account of loss of anticipated overhead, profits, or revenue, or other economic loss arising out of or resulting from such termination.

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

- A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

### **ARTICLE 17 – FINAL RESOLUTION OF DISPUTES**

#### 17.01 *Methods and Procedures*

- A. *Disputes Subject to Final Resolution:* The following disputed matters are subject to final resolution under the provisions of this Article:
  - 1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full; and
  - 2. Disputes between Owner and Contractor concerning the Work or obligations under the Contract Documents, and arising after final payment has been made.
- B. *Final Resolution of Disputes:* For any dispute subject to resolution under this Article, Owner or Contractor may:
  - 1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions; or
  - 2. agree with the other party to submit the dispute to another dispute resolution process; or
  - 3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

### **ARTICLE 18 – MISCELLANEOUS**

#### 18.01 *Giving Notice*

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:
  - 1. delivered in person, by a commercial courier service or otherwise, to the individual or to a member of the firm or to an officer of the corporation for which it is intended; or



2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the sender of the notice.

#### 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 shall not constitute a waiver of that provision, nor shall it affect the enforceability of that provision or of the remainder of this Contract.

#### 18.06 *Survival of Obligations*

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

#### 18.07 *Controlling Law*

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

#### 18.08 *Headings*

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

## SECTION 00800

### Supplementary Conditions

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract. All provisions that are not so amended or supplemented remain in full force and effect.

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

The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added thereto.

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

SC 5.03 Delete Paragraphs 5.03.A and 5.03.B in their entirety and insert the following:

- A. No reports of explorations or tests of subsurface conditions at or adjacent to the Site, or drawings of physical conditions relating to existing surface or subsurface structures at the Site, are known to Owner.

SC 5.06 Delete Paragraphs 5.06.A and 5.06.B in their entirety and insert the following:

- A. No reports or drawings related to Hazardous Environmental Conditions at the Site are known to Owner.
- B. Not Used.

#### ARTICLE 6 – BONDS AND INSURANCE

SC 6.03 Add the following new paragraph immediately after Paragraph 6.03.J:

- K. The limits of liability for the insurance required by Paragraph 6.03 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

- 1. Workers' Compensation, and related coverages under Paragraphs 6.03.A.1 and A.2 of the General Conditions:

State:	<u>Statutory</u>
Federal, if applicable (e.g., Longshoreman's):	<u>Statutory</u>
Jones Act coverage, if applicable:	
Bodily injury by accident, each accident	\$ <u>N/A</u>
Bodily injury by disease, aggregate	\$ <u>N/A</u>

Employer's Liability:

Bodily injury, each accident	\$ <u>250,000</u>
Bodily injury by disease, each employee	\$ <u>250,000</u>
Bodily injury/disease aggregate	\$ <u>500,000</u>

For work performed in monopolistic states, stop-gap liability coverage shall be endorsed to either the worker's compensation or commercial general liability policy with a minimum limit of: \$ N/A

Foreign voluntary worker compensation Statutory

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

General Aggregate	\$ <u>2,000,000</u>
Products - Completed Operations Aggregate	\$ <u>N/A</u>
Personal and Advertising Injury	\$ <u>2,000,000</u>
Each Occurrence (Bodily Injury and Property Damage)	\$ <u>2,000,000</u>

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

**Bodily Injury:**

Each person	\$ <u>2,000,000</u>
Each accident	\$ <u>2,000,000</u>

**Property Damage:**

Each accident	\$ <u>2,000,000</u>
---------------	---------------------

*[or]*

Combined Single Limit of	\$ <u>2,000,000</u>
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**4. Excess or Umbrella Liability:**

Per Occurrence	\$ <u>N/A</u>
General Aggregate	\$ <u>N/A</u>

**5. Contractor's Pollution Liability:**

Each Occurrence	\$ <u>N/A</u>
General Aggregate	\$ <u>N/A</u>

---

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

6. Additional Insureds: In addition to Owner and Engineer, include as additional insureds the following: N/A
7. Contractor's Professional Liability:
- |                  |    |                |
|------------------|----|----------------|
| Each Claim       | \$ | <u>  N/A  </u> |
| Annual Aggregate | \$ | <u>  N/A  </u> |

**ARTICLE 10 – ENGINEER'S STATUS DURING CONSTRUCTION**

**SC-10.03** Add the following new paragraphs immediately after Paragraph 10.03.A:

- B.** The Resident Project Representative (RPR) will be Engineer's representative at the Site, will act as directed by and under the supervision of Engineer, and will confer with Engineer regarding RPR's actions.
1. **General:** RPR's dealings in matters pertaining to the Work in general shall be with Engineer and Contractor. RPR's dealings with Subcontractors shall only be through or with the full knowledge and approval of Contractor. RPR shall generally communicate with Owner only with the knowledge of and under the direction of Engineer.
  2. **Schedules:** Review the progress schedule, schedule of Shop Drawing and Sample submittals, and Schedule of Values prepared by Contractor and consult with Engineer concerning acceptability.
  3. **Conferences and Meetings:** Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings, and prepare and circulate copies of minutes thereof.
  4. **Liaison:**
    - a. Serve as Engineer's liaison with Contractor. Working principally through Contractor's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.
    - b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.
    - c. Assist in obtaining from Owner additional details or information, when required for proper execution of the Work.
  5. **Interpretation of Contract Documents:** Report to Engineer when clarifications and interpretations of the Contract Documents are needed

and transmit to Contractor clarifications and interpretations as issued by Engineer.

6. **Shop Drawings and Samples:**
  - a. Record date of receipt of Samples and Contractor-approved Shop Drawings.
  - b. Receive Samples which are furnished at the Site by Contractor, and notify Engineer of availability of Samples for examination.
  - c. Advise Engineer and Contractor of the commencement of any portion of the Work requiring a Shop Drawing or Sample submittal for which RPR believes that the submittal has not been approved by Engineer.
7. **Modifications:** Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, if any, to Engineer. Transmit to Contractor in writing decisions as issued by Engineer.
8. **Review of Work and Rejection of Defective Work:**
  - a. Conduct on-Site observations of Contractor's work in progress to assist Engineer in determining if the Work is in general proceeding in accordance with the Contract Documents.
  - b. Report to Engineer whenever RPR believes that any part of Contractor's work in progress is defective, will not produce a completed Project that conforms generally to the Contract Documents, or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Engineer of that part of work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.
9. **Inspections, Tests, and System Start-ups:**
  - a. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate Owner's personnel, and that Contractor maintains adequate records thereof.
  - b. Observe, record, and report to Engineer appropriate details relative to the test procedures and systems start-ups.
10. **Records:**
  - a. Prepare a daily report or keep a diary or log book, recording Contractor's hours on the Site, Subcontractors present at the Site, weather conditions, data relative to questions of Change Orders, Field Orders, Work Change Directives, or changed conditions, Site visitors, deliveries of equipment or materials, daily activities, decisions, observations in general, and specific observations in more detail as in the case of observing test procedures; and send copies to Engineer.

- b. Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of all Contractors, Subcontractors, and major Suppliers of materials and equipment.
- c. Maintain records for use in preparing Project documentation.

**11. Reports:**

- a. Furnish to Engineer periodic reports as required of progress of the Work and of Contractor's compliance with the Progress Schedule and schedule of Shop Drawing and Sample submittals.
- b. Draft and recommend to Engineer proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.
- c. Immediately notify Engineer of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, force majeure or delay events, damage to property by fire or other causes, or the discovery of any Constituent of Concern or Hazardous Environmental Condition.

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

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

**14. Completion:**

- a. Participate in Engineer's visits to the Site to determine Substantial Completion, assist in the determination of Substantial Completion and the preparation of a punch list of items to be completed or corrected.
- b. Participate in Engineer's final visit to the Site to determine completion of the Work, in the company of Owner and Contractor, and prepare a final punch list of items to be completed and deficiencies to be remedied.
- c. Observe whether all items on the final list have been completed or corrected and make recommendations to Engineer concerning acceptance and issuance of the notice of acceptability of the work.

**C. The RPR shall not:**

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

2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.
3. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.
4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of Contractor's work.
5. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.
6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.
7. Accept Shop Drawing or Sample submittals from anyone other than Contractor.
8. Authorize Owner to occupy the Project in whole or in part.

#### **ARTICLE 15 – PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD**

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

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

#### **ARTICLE 17 – FINAL RESOLUTION OF DISPUTES**

**SC-17.02** Add the following new paragraph immediately after Paragraph 17.01.

##### **SC-17.02 Arbitration**

- A. All matters subject to final resolution under this Article will be decided by arbitration in accordance with the rules of [*arbitration agency to be determined at time of need*], subject to the conditions and limitations of this paragraph. This agreement to arbitrate and any other agreement or consent to arbitrate entered into will be specifically enforceable under the prevailing law of any court having jurisdiction.
- B. The demand for arbitration will be filed in writing with the other party to the Contract and with the selected arbitrator or arbitration provider, and a copy will be sent to Engineer for information. The demand for arbitration will be made within the specific time required in this Article, or if no specified time is applicable within a reasonable time after the matter in question has arisen, and in no event shall any such demand be made after the date when institution of

legal or equitable proceedings based on such matter in question would be barred by the applicable statute of limitations. The demand for arbitration should include specific reference to Paragraph SC-17.02.D below.

- C. No arbitration arising out of or relating to the Contract shall include by consolidation, joinder, or in any other manner any other individual or entity (including Engineer, and Engineer's consultants and the officers, directors, partners, agents, employees or consultants of any of them) who is not a party to this Contract unless:
  - 1. the inclusion of such other individual or entity is necessary if complete relief is to be afforded among those who are already parties to the arbitration; and
  - 2. such other individual or entity is substantially involved in a question of law or fact which is common to those who are already parties to the arbitration and which will arise in such proceedings.
- D. The award rendered by the arbitrator(s) shall be consistent with the agreement of the parties, in writing, and include a concise breakdown of the award, and a written explanation of the award specifically citing the Contract provisions deemed applicable and relied on in making the award.
- E. The award will be final. Judgment may be entered upon it in any court having jurisdiction thereof, and it will not be subject to modification or appeal, subject to provisions of the Laws and Regulations relating to vacating or modifying an arbitral award.
- F. The fees and expenses of the arbitrators and any arbitration service shall be shared equally by Owner and Contractor.

**SC-17.03** Add the following new paragraph immediately after Paragraph 17.02.

**SC-17.03 Attorneys' Fees:** For any matter subject to final resolution under this Article, the prevailing party shall be entitled to an award of its attorneys' fees incurred in the final resolution proceedings, in an equitable amount to be determined in the discretion of the court, arbitrator, arbitration panel, or other arbiter of the matter subject to final resolution, taking into account the parties' initial demand or defense positions in comparison with the final result.



**Work Change Directive No.**

Date of Issuance: \_\_\_\_\_ Effective Date: \_\_\_\_\_  
 Owner: KW Resort Utilities Corp. Owner's Contract No.: \_\_\_\_\_  
 Contractor: \_\_\_\_\_ Contractor's Project No.: \_\_\_\_\_  
 Engineer: Weiler Engineering Engineer's Project No.: 18013.017  
 Project: KWRU 6" Interconnecting Forcemain Contract Name: \_\_\_\_\_

Contractor is directed to proceed promptly with the following change(s):

Description:

Attachments: *[List documents supporting change]*

**Purpose for Work Change Directive:**

Directive to proceed promptly with the Work described herein, prior to agreeing to changes on Contract Price and Contract Time, is issued due to: *[check one or both of the following]*

- Non-agreement on pricing of proposed change.
- Necessity to proceed for schedule or other Project reasons.

**Estimated Change in Contract Price and Contract Times (non-binding, preliminary):**

Contract Price \$ \_\_\_\_\_ [increase] [decrease].  
 Contract Time \_\_\_\_\_ days [increase] [decrease].

**Basis of estimated change in Contract Price:**

- Lump Sum  Unit Price
- Cost of the Work  Other

RECOMMENDED:

AUTHORIZED BY:

RECEIVED:

By: _____	By: _____	By: _____
Engineer (Authorized Signature)	Owner (Authorized Signature)	Contractor (Authorized Signature)
Title: _____	Title: _____	Title: _____
Date: _____	Date: _____	Date: _____

Approved by Funding Agency (if applicable)

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

Date of Issuance:	Effective Date:
Owner: KW Resort Utilities Corp.	Owner's Contract No.:
Contractor:	Contractor's Project No.:
Engineer: Weiler Engineering	Engineer's Project No.: 18013.017
Project: KWRU 6" Interconnecting Forcemain	Contract Name:

The Contract is modified as follows upon execution of this Change Order:  
 Description:

Attachments: *[List documents supporting change]*

CHANGE IN CONTRACT PRICE	CHANGE IN CONTRACT TIMES <i>[note changes in Milestones if applicable]</i>
Original Contract Price:  \$ _____	Original Contract Times: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
[Increase] [Decrease] from previously approved Change Orders No. ___ to No. ___:  \$ _____	[Increase] [Decrease] from previously approved Change Orders No. ___ to No. ___: Substantial Completion: _____ Ready for Final Payment: _____ days
Contract Price prior to this Change Order:  \$ _____	Contract Times prior to this Change Order: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
[Increase] [Decrease] of this Change Order:  \$ _____	[Increase] [Decrease] of this Change Order: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
Contract Price incorporating this Change Order:  \$ _____	Contract Times with all approved Change Orders: Substantial Completion: _____ Ready for Final Payment: _____ days or dates

RECOMMENDED:	ACCEPTED:	ACCEPTED:
By: _____ Engineer (if required)	By: _____ Owner (Authorized Signature)	By: _____ Contractor (Authorized Signature)
Title: _____	Title _____	Title _____
Date: _____	Date _____	Date _____

Approved by Funding Agency (if applicable)  
 By: \_\_\_\_\_ Date: \_\_\_\_\_  
 Title: \_\_\_\_\_

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Date of Issuance: \_\_\_\_\_ Effective Date: \_\_\_\_\_  
Owner: KW Resort Utilities Corp. Owner's Contract No.: \_\_\_\_\_  
Contractor: \_\_\_\_\_ Contractor's Project No.: \_\_\_\_\_  
Engineer: Weiler Engineering Engineer's Project No.: 18013.017  
Project: KWRU 6" Interconnecting FM Contract Name: \_\_\_\_\_

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Contractor is hereby directed to promptly execute this Field Order, issued in accordance with General Conditions Paragraph 11.01, for minor changes in the Work without changes in Contract Price or Contract Times. If Contractor considers that a change in Contract Price or Contract Times is required, submit a Change Proposal before proceeding with this Work.

Reference: \_\_\_\_\_  
Specification(s) \_\_\_\_\_ Drawing(s) / Detail(s) \_\_\_\_\_

---

Description:

Attachments:

---

ISSUED:	RECEIVED:
By: _____ Engineer (Authorized Signature)	By: _____ Contractor (Authorized Signature)
Title: _____	Title: _____
Date: _____	Date: _____

Copy to: Owner

SPECIFICATIONS

FOR

**KWRU 6" INTERCONNECTING FORCEMAIN**

OWNER:

**KW Resort Utilities Corp.**

6630 Front St,  
Key West, Florida 33040

*WEC Job No: 18013.017*

by

**THE WEILER ENGINEERING CORPORATION**

6805 OVERSEAS HIGHWAY  
MARATHON, FLORIDA

SEPTEMBER 2019

THIS IS TO CERTIFY THAT THE ENCLOSED ENGINEERING SPECIFICATIONS  
WERE PREPARED BY ME OR UNDER MY RESPONSIBLE CHARGE.

Stephen J. Suggs , State of Florida,  
Professional Engineer, License No. 85237  
This item has been digitally signed and  
sealed by Stephen J. Suggs on the date  
indicated here.  
Printed copies of this document are not  
considered signed and sealed and the  
signature must be verified on any  
electronic copies.

\_\_\_\_\_  
Stephen J Suggs, PE, FL License No. 85237

\_\_\_\_\_  
Date

## **DIVISION 1: GENERAL REQUIREMENTS**

SECTION 01010  
SUMMARY OF WORK

PART 1 GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General Conditions, Supplementary Conditions (if included), and other Division 1 Specifications Sections, apply to this Section.

1.2 SECTION INCLUDES

- A. Contract description.
- B. Work by others.
- C. Contractor use of Site.
- D. Work sequence.
- E. Owner occupancy.

1.3 CONTRACT DESCRIPTION

Contract Type: Stipulated Price as described in the Agreement.

1.4 WORK BY OTHERS

- A. Work under these Contracts includes: Any portion of work described in the plans as work to be performed by others. Unless specifically stated, it is implied that all work shown is the responsibility of the contractor.

1.5 CONTRACTS

The strategy for the completion of the project consists of the contracts as follows:

A. Scope of work

The scope of work consist of installing a interconnecting 6" forcemain between an existing 4" and 6" line. Taps of existing lines will be required as well as installation of valves. Once work is completed site and road restoration shall be required.

B. Project Overview

The contractor shall be responsible for the following items however not all aspects of construction are contained in this list. It is the Contractor's responsibility to provide all work necessary to complete the project as intended and restore the area as indicated in the construction documents.

- i. Installation of a 6" interconnecting forcemain.

The project includes installation of a 6" interconnecting forcemain. The main will be installed via hot tap of the existing 4" forcemain located at the entrance to MCDC. The 6" line will run from that point of connection approximately 600 feet to the existing 6" forcemain located at the Key West Golf Club entrance drive. A hot tap shall be made at the existing 6" upstream of the existing gate valve. All isolation valve shall be installed as detailed in the plans and specifications.

- ii. Restoration of work Area

All roads, sidewalk, sodded areas, etc. shall be restored to their pre-construction state in accordance with the project plans and specifications.

For a more detailed description of the project please refer to the project drawings and specifications.

## 1.6 CONTRACTOR USE OF SITE

- A. Limit use of Site to allow:
  - 1. Owner occupancy.
  - 2. Work by Others.
- B. The existing facility/ infrastructure must remain in operation while new construction is in progress.
- C. The Contractor shall coordinate his Work with the Owner so that construction will not usually restrain or hinder operation of the existing facility/ infrastructure or Others working on site. If, at any time, any portion of the facility/ infrastructure must be taken out of service in order for the Work to proceed, the Contractor must obtain approval from the Owner as to the date, time and length of time that portion of the facility is out of service. Approval must be gained ten (10) days in advance of the necessary outage. The Owner shall exercise good faith in attempting to accommodate the Contractor's desire to take existing facility/ infrastructure out of service. However, the Owner retains sole discretion as to the scheduling of any such service outage and, provided the Owner does not act arbitrarily or in bad faith, the Contractor waives any claim to additional contract time or additional contract price as a result of the Owner's decisions regarding scheduling of service outages.
- D. Connections to the existing facility/ infrastructure or alteration of existing facility/ infrastructure will be made at times when the piping or facility involved is not in use or at times, established by the Owner, when use of the piping or facility can be conveniently interrupted for the period of time needed to make the connection or alteration.
- E. After having coordinated his work with the Owner, the Contractor shall notify the Engineer of the Contractor's desired time, time limits and methods of each connection or alteration and have approval of the Engineer before any work is undertaken on the connections or alterations.
- F. Before any on-site roadway or facilities are blocked off the Owner shall be contacted to

coordinate operations for the facility. Off-site roadway work is to be coordinated with the local governing agency and (or) the Florida Department of Transportation, as appropriate.

- G. The existing facility shall remain the property of the Owner, unless reused by written authorization. This includes all parts, equipment, materials and appurtenances. At the discretion of the Owner, this contract shall demolish and dispose of all demolished materials in an approved and environmentally-safe manner onto Contractor supplied trucks for removal. Or at the Owner's discretion, assist in salvage of the equipment by disassembly and loading onto Owner supplied trucks for removal.

#### 1.7 WORK SEQUENCE

Construct Work in phases to accommodate Owner's occupancy requirements and Work by Others during the construction period, coordinate construction schedule and operations with Owner.

#### 1.8 OWNER OCCUPANCY

- C. Owner intends to occupy the existing portion of the facility to maintain operations.
- D. Owner will occupy the Site during the entire period of construction for the conducting of normal operations.
- E. Cooperate with Owner to minimize conflict, and to facilitate Owner's operations.
- F. Schedule the Work to accommodate Owner occupancy.

#### PART 2 PRODUCTS

Not Used.

#### PART 3 EXECUTION

Not Used.

END OF SECTION



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## SECTION 01270

### MEASUREMENT AND PAYMENT

#### GENERAL

##### Description

A Payment for all Work done in compliance with the Contract Documents, inclusive of furnishing all manpower, equipment, materials, and performance of all operations relative to construction of this project, will be made under Pay Items listed herein. Work for which there is not a Pay Item will be considered incidental to the Contract and no additional compensation will be allowed.

B The Contractor shall take no advantage of any apparent error or omission in the Drawings or Specifications, and the Engineer shall be permitted to make corrections and interpretations as may be deemed necessary for fulfillment of the intent of the Contract Documents.

C The Engineer will make measurements and determinations as necessary to classify the work within pay items and determine the quantities for pay purposes.

D Where pay item numbers are shown on the bid form, they generally follow FDOT pay item number formatting; however, they are only provided in order to use them for pay application purposes. FDOT pay item descriptions do not apply; utilize the descriptions on the bid form and within this section to determine the work associated with each pay item.

#### Part II. PAY ITEMS

##### 1.01 Mobilization

A Work Includes preparatory work and operations in mobilizing for beginning work on the project, including, but not limited to, those operations necessary for the movement of personnel, equipment, supplies and incidentals to the project site. Mobilization shall not exceed 5% of the total Bid.

B Unit of measurement is Lump Sum.

##### 1.02 Bonds, insurance and taxes as required by the General Conditions.

A Work Includes all costs associated with bonds, insurance, taxes and general conditions of the contract.

B Unit of measurement is Lump Sum.

2.01 Maintenance of Traffic

A Work Includes Maintenance of Traffic in compliance with the requirements of the agency having jurisdiction and includes traffic control devices, flagmen and all associated materials and labor.

B Unit of measurement is Lump Sum and will be paid according to Percent Complete.

2.02 Erosion and Sediment Control

A Work Includes preparation and implementation of stormwater pollution prevention control plan, including monitoring, inspecting, and reporting, providing erosion and sediment control measures, preparing and filing EPA NPDES NOI and NOT forms, and providing required contractor certifications.

B Unit of measurement is Lump Sum and will be paid according to Percent Complete.

2.03 6" SDR 26 or C900 Pressure Class FM

A Work includes supply, installation and testing of approximately ±600 LF of 6" forcemain and all associated equipment and components including trenching, backfill, etc. as described Bid Documents, including but not limited to the Construction Plans Specifications.

B Lump Sum using linear feet as unit of measurement.

2.04 6" Valves

A Work includes supply, installation and testing of valves and valve boxes and all associated components as described Bid Documents, including but not limited to the Construction Plans and Specifications.

A Unit of measurement is Each.

2.05 6" Hot tap

A Work includes supply, installation and testing of piping and all associated fittings and components as described Bid Documents, including but not limited to the Construction Plans and Specifications.

B Unit of measurement is Each

2.06 4" Hot tap

C Work includes supply, installation and testing of piping and all associated fittings

and components as described Bid Documents, including but not limited to the Construction Plans and Specifications.

A Unit of measurement is Each

2.07 Restoration

A Work includes supply and installation of restoration components, including asphalt trench repair, sidewalk repair, curb and gutter repair, sod and gravelly to match existing as described Bid Documents, including but not limited to the Construction Plans and Specifications.

B Unit of measurement is Square Yard.

2.08 Record Drawings

A Work includes production of Record Drawings, to be provided in hard copy, signed and sealed by a Professional Engineer or Land Surveyor licensed in the state of Florida. Electronic copies in both PDF and AutoCAD format shall also be provided. Record Drawings are to be produced in accordance with the requirements of the General Conditions and Specifications

B Unit of measurement is Lump Sum.

**Part II. EXECUTION - NOT USED**

**END OF SECTION**

SECTION 01300  
SUBMITTALS

PART 1 GENERAL

1.1 EQUIPMENT DELIVERY AND CONSTRUCTION SCHEDULE

Not later than 10 consecutive calendar days after the issuance of the "Notice to Proceed," the Contractor shall submit to the Engineer for review a detailed schedule of major equipment delivery and installation and general construction operations, indicating the sequence of the work, the estimated dates of starting each task, and the estimated time of completion of each task. The schedule shall be broken down with respect to individual structures and facilities, indicating when existing structures or equipment would be taken out of service (if applicable). The form and content of the schedule shall be satisfactory to the Engineer.

1.2 SHOP DRAWINGS AND PRODUCT DATA

- A. The Contractor shall submit to the Engineer for review and approval complete drawings and engineering data for all equipment, materials, and products to be incorporated into the work. Shop drawings and engineering data shall be provided and the Engineer's review will be conducted in accordance with the requirements of this section. Shop drawings and/or engineering data, as appropriate, shall be submitted for the following items, including, but not limited to all items shown on the Drawings or specified in these Specifications.
- B. Engineering data submitted for items of mechanical and electrical equipment shall include the following, as applicable:
  - 1. Complete material specifications and bill of materials
  - 2. Performance specifications and curves and operating characteristics
  - 3. Shipping, handling, storage, and protection instructions
  - 4. Anchorage and embedment details
  - 5. Assembly, erection, and installation diagrams and instructions
  - 6. Assembled weight
  - 7. Welding qualifications and qualification procedures
  - 8. Factory test data and results
  - 9. Specifications on surface preparation and shop finishes
  - 10. Manufacturers' product bulletins or catalog sheets.
- C. Shop drawings and engineering data for equipment supplied as a pre-engineered or pre-assembled system shall include complete shop drawings and engineering data on each component of that system. In all cases, the information provided shall be sufficient to determine if the material or product conforms to the requirements of the Specifications.
- D. Shop drawings and engineering data shall be prepared by the original equipment vendors or fabricators, as applicable. Purchase specifications by the Contractor or his Supplier shall not be acceptable as a substitute for actual vendor drawings and data.

- E. Shop drawings for motor control circuits shall include complete schematic control diagrams, wiring diagrams, and terminal connection diagrams. Each control step in the schematic control diagrams shall include a step identification number and a brief functional description. Each control step shall be cross-referenced with other control steps with which it connects using the appropriate step identification numbers.
- F. Shop drawings for instrument and control systems shall include, where applicable, complete process and instrumentation diagrams in ISA format, detailed loop diagrams, program descriptions, logic diagrams, wiring diagrams, and terminal connection diagrams.
- G. All controls shall be completely described as to function: normally-open, normally-closed, fail open, fail closed, direct acting, reverse acting, air-to-open, air-to-close, etc. Settings of all pressure and temperature switches, relief valves, rupture discs, pressure regulators, etc., shall be noted.
- H. All shop drawings shall include a legend or other suitable means to identify all symbols and abbreviations used on the drawing. Where an accepted, industry-wide drafting standard or symbol has been established for a particular item, information depicted on the shop drawings shall conform to that standard.
- I. Shop drawings shall be dimensioned using the U.S. standard unit of measurement (feet and/or inches). Size of drawing shall not exceed 24 by 36 inches. All scaled drawings and details shall have the scale clearly noted on the drawing or detail. All information shall be clear and legible.
- J. Each shop drawing and each item of engineering data shall contain a cover sheet that bears the Contractor's approved stamp indicating that the Contractor has reviewed the drawing or data for conformance with the Contract Documents. The cover sheet shall also allow room for the Engineer's review stamp, which is approximately 3<sup>1</sup>/<sub>2</sub> inches wide by 4<sup>1</sup>/<sub>2</sub> inches high.
- K. All design calculations and drawings for foundations and footings, sheeting and shoring, and concrete formwork shall bear the signed and dated stamp of a licensed professional engineer.

### 1.3 MISCELLANEOUS SUBMITTALS

- A. The Contractor shall submit to the Engineer miscellaneous information, procedures, test data, samples, etc., in the manner and at the time specified in these Specifications and Contract Documents. Miscellaneous submittals shall include, but not be limited to, the following:
  - 1. Procedures for handling and disposing of sewage flows during construction.
  - 2. Factory test data and results where specified for specific items of equipment.
  - 3. Schedule of values.
  - 4. Preliminary Operation and Maintenance Manuals.
  - 5. Final Operation and Maintenance Manuals.
  - 6. Samples of wire and cable, casework, window glazing details, concrete masonry units, quarry tile, roofing and flashing, push-on PVC joint details, and other items as specified in the Specifications.
  - 7. Preliminary concrete mix design reports.

8. Satisfactory written evidence in the form of laboratory or mill test reports indicating that all cement, aggregate, masonry, structural steel, fencing, castings, steel reinforcement, conduit, pipe, grout, grass seed and other items incorporated into the work are in compliance with the requirements of these Specifications.
9. Project record documents.
10. Copies of original invoices of all equipment delivered to the site.
11. When requested, analysis and design data on concrete formwork and sheeting and shoring.
12. Drawings and details of erosion and sediment control structures.
13. Written evidence of equipment warranties.

#### 1.4 SAMPLES

At the Engineer's request, the Contractor shall furnish certified samples of materials utilized in the fabrication or production of equipment, materials, and products supplied under these Contract Documents. Cost of all such samples shall be borne by the Contractor. The samples will be tested by a qualified independent testing laboratory selected by the Owner to determine if the mechanical and chemical properties of the materials supplied are in accordance with the requirements of these Specifications and Contract Documents. The Owner shall pay for the laboratory testing of material samples provided by the Contractor. The Contractor shall pay for all retests made necessary by the failure of materials to conform to the requirements of these Specifications and Contract Documents.

#### 1.5 PROGRESS RECORD PICTURES

- A. The Contractor shall furnish three copies of 5- by 7-inch pictures as a record of progress made each month. These pictures will be a minimum of six each month taken from locations designated by the Resident Project Representative to best show progress of Project and will include the following:
  1. Project name
  2. Owner's name and contract number
  3. Contractor's name and job number
  4. View and general description of what photograph shows
  5. Date photograph was taken.Prints shall be submitted to the Engineer in a regular photograph mailer marked "Photographs-Do Not Bend." Cost of photographs shall be included in the lump sum price bid and no separate payment will be made therefore.

END OF SECTION

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## SECTION 01310

### ADMINISTRATIVE REQUIREMENTS

#### PART 1 GENERAL

##### 1.01 Section Includes

Meetings, construction progress documentation, submittals, record documents

##### 1.02 Preconstruction Meeting

The Owner will schedule a preconstruction meeting prior to beginning the Work to review shop drawing procedures, submittal requirements, and construction administration requirements (project coordination and communication). The Contractor shall bring to the preconstruction meeting the proposed construction schedule, which will be reviewed with the Owner during the meeting.

##### 1.03 Definitions

- A. Shop Drawings - Shop drawings are original drawings, prepared by the Contractor, a subcontractor, supplier, or distributor, which illustrate some portion of the Work; showing fabrication, layout, setting, or erection details. Shop drawings shall be prepared by a qualified detailer and shall be identified by reference to sheet and detail numbers on the Contract Drawings
- B. Product Data - Product data are manufacturer's standard schematic drawings and manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations, and other standard descriptive data. Catalog sheets, brochures, etc., shall be clearly marked to identify pertinent materials, products, or models.
- C. Samples - Samples are physical examples to illustrate materials, equipment, or workmanship and to establish standards by which work is to be evaluated.

##### 1.04 Submittal Requirements

- A. Prior to submission, thoroughly check shop drawings, product data, and samples for completeness and for compliance with the Contract Documents. Verify all field measurements, quantities, dimensions, specified performance criteria, fabrication, shipping, handling, storage, assembly, installation, and safety requirements.
- B. Coordinate the submittals with the requirements for other related work.
- C. Notify the Engineer, in writing at the time of submission, of deviations in submittals from the requirements of the Contract Documents. The Contractor's responsibility

for deviations in submittals from the requirements of the Contract Documents is not relieved by the Engineer's review of submittals, unless the Engineer gives written acceptance of specific deviations.

- D. Submit at least one digital copy of each shop drawing and product data. The specific number of copies required of all submittals will be determined during the preconstruction meeting. Submit the number of samples indicated in the individual Specification Sections.
- E. Where a specific product manufacturer and model number is listed in individual specification sections and is proposed by the Contractor to be used, full submittal of product data is not required. In this case, submit in letter format the name of the product, manufacturer, model number, specification section, and name of project. Certify the identified product is proposed to be used in the project.
- F. Shop drawings, product data, and samples shall be accompanied by a letter of transmittal referring to the name of the project and to the specification page number and/or Drawing number for identification of each item. Submittals for each type of work shall be numbered consecutively, and the numbering system shall be retained throughout all revisions.
- G. Submittals shall bear the Contractor's stamp of approval certifying that they have been checked and indicate appropriate specification section and/or drawing location. Submittals without the Contractor's initialed or signed certification stamp and submittals which, in the Engineer's opinion, are incomplete, contain numerous errors or have not been properly checked, will be returned unchecked by the Engineer for resubmission.
- H. Begin no work which requires submittals until return of submittals with Engineer stamp and initials or signature indicating the submittal has been approved.

#### **1.05 Engineer Review of Submittals**

- A. Engineer's review and approval of submittals will not extend to means, methods, techniques, sequences, procedures of construction or to safety precautions.
- B. The review and approval of a separate item will not indicate approval of the assembly in which the item functions. Engineer's review and approval of submittals shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents.
- C. The Engineer will review submittals with reasonable promptness. The Engineer's review of submittals shall not be construed as a complete check and shall not relieve the Contractor from responsibility for complete compliance with the Contract requirements.

- D. No corrections, changes, or deviations indicated on submittals reviewed by the Engineer shall be considered as a change order.
- E. Where review of submittals is required by the Owner of other agencies, the Engineer will forward the appropriate submittal(s) to these parties after Engineer review. Once review of all parties is complete, the submittal(s) will be returned to the Contractor reflecting the review of all parties
- F. If the submittal is not satisfactory, one copy of the submitted item will be retained by the Engineer and all other copies returned to the Contractor for appropriate action.
- G. In the event a third submittal is required, due to previous submittals of incomplete or incorrect data or not in compliance with the Contract Documents, the Contractor will be charged one-half of the cost incurred by the Engineer for the review of the third submittal. The Contractor shall bear the total cost incurred by the Engineer for all subsequent reviews. The Engineer costs charged to the Contractor will be at the cost plus rate generally charged by the Engineer and will be deducted by the Owner from payments due to the Contractor.
- H. Distribution of copies of acceptable submittals will be as mutually determined by the Contractor, Owner, and Engineer on an individual item basis during or following the preconstruction conference.

#### **1.06 Progress Meetings**

- A. The frequency of progress meetings shall be determined during the preconstruction meeting. As a minimum, progress meetings shall be held once per month during construction.
- B. The Contractor and Owner shall attend the progress meetings.
- C. The Contractor shall provide a meeting agenda and keep minutes of each progress meeting.

#### **1.07 Record Drawings**

- A. As the Work progresses, the Contractor shall be responsible for recording information on the approved Contract Documents concurrently with construction progress. This field copy shall be maintained in the field office in clean and legible condition. It shall be available for inspection by the Owner or Engineer at any time. It shall also be provided to the Engineer as shown in item 1.07.F.
- B. Mark on the Contract Drawings all changes in direction, elevation and location of structure, piping, equipment, electrical, and mechanical work.

- C. If requested, mark on the Specifications the manufacturer, trade name, catalog, and supplier of each product actually installed, and mark changes made by Change Order or Field Order.
- D. All Record Drawings shall be prepared by Contractor in ACAD format using base drawings provided by Engineer. As-built information shall be field verified, measured, certified, signed and sealed by the Contractor's licensed Surveyor who will be responsible for the accuracy of all dimensions and elevations.
- E. The as-built information shown on the Record Drawings is to include, but not be limited to, the following:
  - 1. Horizontal locations and vertical elevations for all installed utility lines and storm structures including but not limited to manholes, valves, inlets and cleanouts, etc.
  - 2. Distance along pipelines between valves.
  - 3. Vertical elevations of all pipelines at crossing of potable water mains (whether the water main is existing or new) in order to document that the minimum required vertical separation has been met.
  - 4. Utility pipeline tied horizontally to edge of pavement and right-of-way lines, located every 200-ft. plus all changes in horizontal offset.
  - 5. Horizontal and vertical data for any construction that deviates from the approved engineering drawings.
  - 6. Where the plans contain specific horizontal location data, such as station and offset, the as-built drawings are to reflect the actual horizontal location.
  - 7. Where the plans contain specific vertical elevation data, the as-built drawings are to reflect the actual measured vertical elevation.
- F. Deliver to Engineer one set of Record Drawings signed and sealed by Contractor's surveyor plus one electronic copy (ACAD format) of the drawings. Also deliver the original red-line field copy to the Engineer. Surveyed record drawings must be included each month with payment application packet.

**END OF SECTION**

**SECTION 01315  
PRECONSTRUCTION  
VIDEO**

**PART 1 GENERAL**

**1.01 Description**

Provide continuous color audio-video recording along the entire length of all proposed work prior to construction to serve as a record of pre-construction conditions. Supplement audio-video recordings with color photographs (digital) for areas which require details not ascertainable on the recording.

**1.2 Qualifications**

The preconstruction audio-video recording shall be of professional quality that will clearly log an accurate visual description of existing conditions. Any portion of the recording not acceptable for the determination of the existing conditions shall be re-recorded at no additional cost to the Owner.

**PART 2 PRODUCTS**

**2.01 General**

The total audio-video recording system and the procedures employed in its use shall be such as to produce a finished product that will fulfill the technical requirements of the project. The video portion of the recording shall produce bright, sharp, clear pictures with accurate colors and shall be free from distortion, tearing, rolls or any other form of picture imperfection. The audio portion of the recording shall produce the commentary of the camera operator with proper volume, clarity, and be free from distortion. The recording system shall utilize EIA standard video and NTSC compatible color.

**2.02 Camera**

The color video camera used in the recording system shall have EIA Standard: NTSC type color - 1.0 V 75 Ohms.

**2.03 Recorder**

The recording shall be made in standard DVD format. The recorder shall record the color signal with a minimum horizontal resolution of 525 lines, 60 fields; NTSC color signal; RF modulated - 72dB.

**2.4 Electronic & DVD Media**

The media used for the recordings shall be high quality, high resolution, media able to be played back on any computer or standard DVD player. The media shall be new and thus shall not have been used for any previous recording.

**2.5 Video DVD Playback Compatibility**

The recorded DVD's shall be compatible for playback with any standard DVD player or computer. If electronic storage device is used the media must be formatted to play on a standard computer media player.

## **PART 3 EXECUTION**

### **3.1 General**

- A. The recordings shall contain coverage of all surface features located within the construction's zone of influence. The construction's zone of influence shall be defined (1) as the area within the permanent and temporary easements or right-of-way, and areas adjacent to these areas which may be affected by routine construction operations, and (2) by the direction of the Owner. The surface features within the construction's zone of influence shall include, but not be limited to, all roadways, pavements, curbs, driveways, ponds, sidewalks, culverts, headwalls, retaining walls, buildings, landscaping, trees, shrubbery, and fences. Of particular concern shall be the existence of any faults, fractures, or defects. Recorded coverage shall be limited to one side of the street at any one time and shall include all surface conditions located within the zone of influence of construction supported by appropriate audio description.
- B. The recording of each video segment shall be a simultaneously recorded with the audio recording. This audio recording, exclusively containing the commentary of the camera operator, shall assist in viewer orientation and in any needed identification, differentiation, clarification, or objective description of the feature being shown in the video portion of the recording. The audio recording also shall be free from any conversations between the camera operator and any other production technicians.
- C. All electronic copies shall be permanently labeled and shall be properly identified by project title, number and date of recording.
- D. Each electronic copy shall have a log of that media's contents. The log shall describe the various segments of coverage contained on that video tape in terms of the names of streets or easements, coverage beginning and end, directions of coverage, and video unit counter/segment numbers.

### **3.2 Recording Schedule**

- A. The recording shall be performed prior to the placement of any construction materials or equipment on the proposed construction site.
- B. The Contractor shall coordinate the recording with the construction schedule so that those portions of the construction that will be completed first will be recorded

first. The recording company shall deliver the video tape recordings to the Owner upon their completion. Upon delivery of the DVD's, transfer of ownership of those DVD's shall be made to the Owner.

### **3.3 Visibility**

All recordings shall be performed during times of good visibility. No recording shall be done during periods of significant precipitation, mist, or fog. The recording shall only be done when sufficient sunlight is present to properly illuminate the subject, and to produce bright, sharp video recordings of those subjects. No taping shall be performed when more than 10% of the area to be taped contains debris or obstructions unless otherwise authorized by the Engineer.

### **3.4 Continuity of Coverage**

- A. In order to increase the continuity of the coverage, the coverage shall consist of a single, continuous, unedited recording which begins at one end of a particular construction area. However, where coverage is required in areas not accessible by conventional wheeled vehicles and smooth transport of the recording system is not possible, such coverage shall consist of an organized, interrelated sequence of recordings at various positions along that proposed construction area (e.g., wooded easement area).
- B. The average rate of travel during a particular segment of coverage (e.g., coverage of one side of the street) shall be directly proportional to the number, size, and value of the surface features within that construction area's zone of influence.

### **3.5 Camera Height and Stability**

When conventional wheeled vehicles are used as conveyances for the recording system, the distance between the camera lens and the ground shall not be less than 10 feet. The camera shall be firmly mounted, such that transport of the camera during the recording process will not cause any unsteady picture.

### **3.6 Camera Control**

Camera pan, tilt, zoom-in, and zoom-out rates shall be sufficiently controlled such that recorded objects will be clearly viewed during video tape playback. In addition, all other camera and recording system controls, such as lens, focus, and aperture, video level, pedestal, chroma, white balance, and electrical focus, shall be properly controlled or adjusted to maximize recorded picture quality.

### **3.7 Viewer Orientation Techniques**

The audio and video portions of the recording shall maintain viewer orientation. To this end, overall establishing views and visual displays of all visible house and building addresses shall be utilized. In easements where the proposed construction location will not be readily apparent in the video tape viewer, highly visible yellow flags shall be placed in such a fashion as to clearly indicate the proposed centerline of construction.

### **3.8 Areas to be Recorded**

- A. The Contractor shall be able to televise and record areas with paved roads, along easements, through parks, lawns, and open fields and inside buildings. When recording on private property, the Contractor shall give the Owner sufficient prior notice of such entry so that property owners may be advised of, and their permission obtained for, the work.
- B. At no time shall the Contractor be allowed to use any electrical circuits within private property building structure. All recording shall be done during regular business hours, unless otherwise specified by the private property owner or the Engineer. The Contractor shall enter and leave private property in a professional and orderly, workmanlike manner.

**END OF  
SECTION**



**SECTION 01320**  
**PROGRESS SCHEDULE**

**PART 1 GENERAL**

**1.01 Section Includes**

Progress scheduling.

**1.02 Submittals**

- A. Prior to construction, prepare a schedule of all major activities needed to complete the project. Include major material and equipment order and delivery times. Submit to Owner no later than the date of the preconstruction conference.
- B. Schedule to utilize Critical Path Method formatted by establishing a precedence diagram which is time scaled. Include on schedule activity start dates, stop dates, and duration; critical path; float; delivery schedules. Include submittal dates and durations for components with extended lead times in schedule.
- C. Project substantial and final completion dates shown on schedule shall be same as or earlier than the contractual dates.

**PART 2 PRODUCTS - Not Used**

**PART 3 EXECUTION**

**3.01 Monitoring and Updating of Schedule**

- A. Float shown on the schedule belongs to the project.
- B. Progress data shall be accumulated to update the schedule on a monthly basis, prior to submittal of the application for payment. Progress data shall include:
  - 1. Activities started
  - 2. Activities completed.
  - 3. Predicted activity starts
  - 4. Predicted activity completions
  - 5. Changes in original duration for specific activities
  - 6. Changes in activity sequences
  - 7. Percent complete on activities
- C. Update of schedule to include effect of the progress projected for the next two (2) reporting periods.

**END OF SECTION**

## SECTION 01340

### SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

#### PART 1 GENERAL

##### 1.1 DESCRIPTION AND REQUIREMENTS

- A. Type of Submittals: This Section of the specifications describes the procedures for submittals such as shop drawings, product data, samples and miscellaneous work-related submittals. It does not include the submittals required for administrative work.
- B. Submittal Contents: The submittal contents required are specified in each section.
- C. Definitions: Submittals are categorized as follows:
  - 1. Shop Drawings
    - a. Shop drawings shall include technical data, drawings, diagrams, performance curves, schedules, templates, patterns, reports, calculation, instructions, measurements and similar information as applicable to specific item for which the shop drawing is prepared.
    - b. Provide newly prepared information, on reproducible sheets, with graphic information at accurate scale (except as otherwise indicated) or appropriate number of prints hereof, with name or preparer (firm name) indicated. The Contract Drawings shall not be traced or reproduced by any method for use as or in lieu of detail shop drawings. Show dimensions and note those based on field measurement. Identify materials and products in the work shown. Indicate compliance with standards and special coordination requirements. Do not allow shop drawing copies without appropriate final "Action" markings by the Engineer to be used in connection with the Work.
  - 2. Product Data
    - a. Product data includes standard printed information on materials, products and systems, not specially prepared for this project, other than the designation of selections from among available choices printed therein.
    - b. Collect required data into one submittal for each unit of work or system, and mark each copy to show which choices and options are applicable to project. Include manufacturer's standard printed recommendations for application and use, compliance with standards, application of labels and seals, notation of field measurements that have been checked, and special coordination requirements.
  - 3. Samples
    - a. Samples include both fabricated and unfabricated physical examples of materials, products and units of work, both as complete units and as smaller portions of units of work, either for limited visual inspection or (where indicated) for more detailed testing and analysis.
    - b. Provide units identical with final condition of proposed materials or products for the work. Include "range" samples (not less than three units) where unavoidable variations must be expected, and describe or identify variations between units of each set. Provide full set of optional samples where the Engineer's selection is

required. Prepare samples to match the Engineer's sample where indicated. Include information with each sample to show generic description, source or product name and manufacturer, limitations, and compliance with standards. Samples are submitted for review and confirmation of color, pattern, texture, and "kind" by the Engineer. Engineer will not "test" samples (except as otherwise indicated) for other requirements, which are the exclusive responsibility of the Contractor.

4. Miscellaneous submittals related directly to the work (non-administrative) include warranties, maintenance agreements, workmanship bonds, project photographs, survey data and reports, physical work records, statements of applicability, quality testing and certifying reports, copies of industry standards, record drawings, field measurement data, operating and maintenance materials, overrun stock, security/protection/safety keys and similar information, devices and materials applicable to the Work but not processed as shop drawings, product data or samples.

## 1.2 GENERAL SUBMITTAL REQUIREMENTS

- A. Scheduling: Where appropriate in various required administrative submittals (listings of products, manufacturers, supplier and subcontractors, and in job progress schedule), show principal work-related submittal requirements and time schedules for coordination and integration of submittal activity with related work in each instance.
- B. Coordination of Submittal Times: Prepare and transmit each submittal to the Engineer sufficiently in advance of performing related work or other applicable activities, so the installation will not be delayed or improperly sequenced by processing times, including non-approval and resubmittal (if required). Coordinate with other submittals, testing, purchasing, delivery and similar sequenced activities. No extension of time will be authorized because of Contractor's failure to transmit submittals to the Engineer sufficiently in advance of the work.
- C. Sequencing Requirements: As applicable in each instance, do not proceed with a unit of work until submittal procedures have been sequenced with related units of work, in a manner which will ensure that the action will not need to be later modified or rescinded by reason of a subsequent submittal which should have been processed earlier or concurrently for coordination.
- D. Preparation of Submittals: Provide permanent marking on each submittal to identify project, date, Contractor, subcontractor, submittal name and similar information to distinguish it from other submittals. Show Contractor's executed review and approval marking and provide space for the Engineer's "Action" marking. Package each submittal appropriately for transmittal and handling. Submittals which are received from sources other than through the Contractor's office will be returned "without action."
- E. Transmittal Identification
  1. Number transmittals in sequence for each Division of the Specifications. The number after the dash indicates the Section of the Specifications, and the number before the dash is the sequence number of the transmittal (1-15140 would be the first transmittal applicable to Section 15140 of the Specifications, 2-15140 would be the second transmittal for Section 15140, etc.)

2. Identify resubmittals with a letter of the alphabet following the original number, using A for the first resubmittal, B for the second resubmittal, etc. A resubmittal affecting transmittal 1-15140 would then be numbered 1A-15140. The number 1-15140 would then be entered in the space "Previous Transmittal Number," which is left blank except on resubmittals.

### 1.3 SPECIFIC CATEGORY REQUIREMENTS

- A. Except as otherwise indicated in the individual work sections, comply with general requirements specified herein for each indicated category of submittal.
  1. Submittals shall contain:
  2. The date of submittal and the dates of any previous submittals.
  3. The project title:
  4. Contract No. \_\_\_\_.
  5. Contractor:
  6. Supplier:
  7. Manufacturer:
  8. Identification of the product, with the Specification Section number and equipment tag numbers.
  9. Field dimensions, clearly identified as such.
  10. Relation to adjacent or critical features of the work or materials.
  11. Applicable standards, such as ASTM or Federal Specification numbers.
  12. Notification to the Engineer in writing, at time of submittal, of any deviations on the submittals from requirements of the Contract Documents.
  13. Identification of revisions on resubmittals.
  14. An 8-inch x 3-inch blank space for Contractor and Engineer stamps.
  15. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of products, field measurements and field construction criteria, and coordination of the information within the submittal with requirements of the Work and of Contract Documents.
  16. Submittal sheets or drawings showing more than the particular item under consideration shall have all but the pertinent description of item for which review is requested crossed out.

### 1.4 ROUTING OF SUBMITTALS

Submittals and routine correspondence shall be routed as follows:

1. Supplier to Contractor (through representative if applicable) for preliminary check.
2. Contractor to Consulting Engineer for general review or comment.
3. Consulting Engineer to Contractor.
4. Contractor to Supplier.

### 1.5 SUBMITTAL COPIES REQUIRED

- A. Shop Drawings, Product Data, and Miscellaneous Submittals  
All submittals marked "A" or "B" will be distributed as follows:
  - 1 . 1 E l e c t r o n i c c o p y .
  - 2 . 1 E l e c t r o n i c c o p y .

- 3. 1 E l e c t r o n i c c o p y .
- 4. 1 E l e c t r o n i c c o p y .

- B. To the above number, additional copies may be added as required by the Contractor.
- C. The Engineer will mark all copies of each shop drawing. One will be retained in the Engineer's office, one sent to the Field Inspection office, one will be retained for the Owner and the remaining copies sent to the Contractor for his records and distribution.
- D. For non-approval items, such as parts lists and operation or maintenance manuals, 1 electronic copy is required, unless specified otherwise:
- E. Samples: In accordance with the QA/QC Plan, the contractor shall furnish certified samples of materials utilized in the fabrication or production of equipment, materials, and products supplied under these Contract Documents. Cost of all such samples shall be borne by the Contractor. The samples will be tested by a qualified independent testing laboratory selected by the Owner to determine if the mechanical and chemical properties of the materials supplied are in accordance with the requirements of these Specifications and Contract Documents. The owner shall pay for the laboratory testing of material samples provided by the Contractor. The Contractor shall pay for (at no additional cost to the Owner) all retests made necessary by the failure of materials to conform to the requirements of these Specifications and Contract Documents.

#### 1.6 REVIEW OF SUBMITTALS

- A. Review Time: Allow a minimum of two weeks for the Engineer's initial processing of each submittal requiring review and response, except allow longer periods where processing must be delayed for coordination with subsequent submittals. The Engineer will advise the Contractor promptly when it is determined that a submittal being processed must be delayed for coordination. Allow two weeks for reprocessing each submittal. Advise the Engineer on each submittal as to whether processing time is critical to progress of the work, and therefore the work would be expedited if processing time could be foreshortened.
- B. Engineer's Action
  - 1. Approved for Construction
  - 2. Approved as noted, meaning it is contingent based on comments.
  - 3. Partial approval which grants approval for a portion of the submittal.
  - 4. Rejected resubmit, is a full rejection of the submittal.

#### 1.7 SPECIAL SUBMITTAL REQUIREMENTS FOR EQUIPMENT, COATINGS, SEALANTS, AND OTHER SYSTEMS

The Contractor is directed to Section 01300, Submittals, for special certifications or other requirements associated with Shop Drawings and submittals.

END OF SECTION

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## SECTION 01380

### CONSTRUCTION PHOTOGRAPHS

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. General: This section specifies administrative and procedural requirements for construction photographs.
- B. Costs: Costs for photographs, album pages, and album shall be included in the lump sum bid price or unit prices contained for other items of work. No separate payment shall be allowed, with the exception of additional photographs, which is addressed elsewhere in this section.

##### 1.2 RELATED DOCUMENTS

Drawings and general conditions of Contract, including General Provisions and other Division 1 specification sections, apply to this section.

##### 1.3 SUBMITTALS

- A. Prints: Submit at least 10 but no more than 20 prints of at least four views directly to the Engineer with each monthly Application for Payment. The Engineer will distribute prints as follows:
  - 1. One print to the Contractor shall be retained in the field office at the project site and shall be available at all times for reference.
  - 2. One print to the Owner as the Owner's permanent record.
  - 3. One print shall be retained in the Engineer's files.
- B. Extra Prints: When requested by the Engineer, the photographer shall submit extra prints of photographs, with distribution directly to designated parties who will pay the costs for the extra prints directly to the photographer.
- C. All photography shall be in digital format. Back-up shall be supplied on flash drive and or C.D. D. Photograph Albums: Provide three loose-leaf, notebook type photo albums with the first Application for Payment. Albums shall be provided as required, if more than one volume of photographs is required to contain the photographs over the length of the construction contract. The front cover of each photo album shall contain the following:
  - 1. Project Name
  - 2. Owner's Name and Contract Number
  - 3. Engineer's Name and Project Number
  - 4. Volume Number
  - 5. Contractor's Name
- D. Album Pages: Album pages shall be punched for standard 3-ring binder. Allow 1-inch-wide margin on the left edge.

## 1.4 QUALITY ASSURANCE

- A. Engage a qualified, experienced photographer to take photographs during construction.
- B. Associated Services - Cooperate with the photographer's work. Provide reasonable auxiliary services as requested, including access to and use of temporary facilities including temporary lighting.

## PART 2 PRODUCTS

### 2.1 PHOTOGRAPHIC COPIES

- A. Provide 5-by-7-inch smooth surface, glossy color prints on single-weight, commercial-grade stock (72 pound), contained in a photo album page. The photographs shall be taken with a 35-mm camera (or larger format) capable of being programmed to show the date the photo was taken on the front of the photograph.
- B. The use of digital photography shall be acceptable and may be substituted for Item 2.1 requirements above. Should the Contractor choose to use digital photography, the camera shall have a resolution of 5.0 mega pixels or greater. The print photos should be a minimum of 5-by-7-inch printed on high gloss photo grade paper of at least 72 pounds or better.
- C. Should digital photography be employed by the Contractor, the project photos shall be submitted in both print and digital format. The digital format shall be in the form of a standard CD, labeled as described herein and the photo files in jpeg format.
- D. Identification: Provide date on front of the photo per the previous paragraph. On the back of each print, provide an applied label or rubber stamped impression with the following information:
  - 1. Name of the Project.
  - 2. Name and address of the photographer.
  - 3. Name of the Engineer.
  - 4. Name of the Contractor.
  - 5. Provide notation of vantage point marked for location and direction of shot on a key plan of the site.

## PART 3 EXECUTION

### 3.1 PHOTOGRAPHIC REQUIREMENTS

- A. Take at least four but no more than six color photographs in accordance with requirements indicated, to best show the status of construction and progress since the previous photographs.
  - 1. Frequency: Take photographs monthly, coinciding with the cutoff date associated with each Application for Payment.
  - 2. Vantage Points: The photographer shall select the vantage points for each shot each month to best show the status of construction and progress since the last photographs.



- B. Additional Photographs: From time to time the Engineer may issue requests for additional photographs, in addition to periodic photographs specified. Additional photographs will be paid for by the Owner or Engineer, and are not included in the contract sum or an allowance.

END OF SECTION

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## **SECTION 01400**

### **GENERAL QUALITY CONTROL**

#### **Part I. GENERAL**

##### **1.01 DESCRIPTION OF REQUIREMENTS**

**(A) Definitions:**

- (i) Specific quality control requirements for the work are indicated throughout the Contract Documents. In particular, quality control provisions for manufactured products are specified in individual work sections and in other related sections of the specifications; and are not repeated in this section. The requirements of this section are primarily related to the performance of the work beyond the furnishing of manufactured products. The term "Quality Control" includes, but is not necessarily limited to, inspection and testing and associated requirements. This section does not specify or modify the Engineer's duties relating to Contract quality review and observation.

##### **1.02 QUALITY ASSURANCE**

**(A) General Workmanship Standards:**

- (i) Except as more definitively specified in other sections of the specifications, comply with the recognized workmanship quality standards within the industry as applicable to each unit of work, including ANSI standards where applicable. It is a requirement that each category of tradesman or installer performing the work be pre-qualified, to the extent of being familiar with the applicable and recognized quality standards for his category of work, and being capable of workmanship complying with those standards.

##### **1.03 SUBMITTALS**

- (A) Refer to Section 01300 for the general submittal requirements applicable to inspection and test reports, project photographs, damage surveys, quality control samples, maintenance agreements, guaranties, warranties, and similar documentation of quality compliances as required. Refer to the individual work sections of the specifications for specific certification and submittal requirements.
- (B) Copies and Distribution: Where inspection and test reports and certifications are required by governing authorities, provide additional copies as required, and, where required, send copies directly from inspection or testing agency to governing authority.

##### **1.04 PRODUCT DELIVERY-STORAGE-HANDLING**

- (A) Materials, supplies, and equipment delivered to the site shall be inspected for damage, unloaded, and stored with a minimum of handling. Delivered items shall not be stored directly on the ground. Handle, store and protect materials and products, including fabricated components, by methods and means recommended by the manufacturer which will prevent damage, deterioration and losses (and resulting delays), thereby ensuring highest quality results as the performance of the work progresses. Control delivery schedules so as to minimize unnecessary long-term storage at the project site prior to

installation. Periodically exercise equipment stored in accordance with the manufacturer's recommendations.

- (B) The Engineer may refuse to accept, or sample for testing, materials, supplies, or equipment that have been improperly or unsuitably stored.
- (C) Materials, supplies or equipment found defective or unfit for use shall not be incorporated in the work and shall immediately be removed from the construction or storage site and replaced with new materials, supplies or equipment by the Contractor at no additional cost to the Owner.
- (D) If, instead of requiring removal and replacement of defective items, the Owner (and, prior to approval of final payment, also the Engineer) prefers to accept the defective item(s), he may do so. In such case, if acceptance occurs prior to approval of final payment, a change order shall be issued incorporating the necessary revisions in the Contract Documents, including appropriate reduction in the Contract price; or if the acceptance occurs after approval of final payment, an appropriate amount shall be paid by the Contractor to the Owner.

#### **1.05 RESPONSIBILITY FOR INSPECTIONS AND TESTS**

##### **(A) Contractors Responsibility:**

- (i) It will be the Contractor's responsibility to employ and pay for the services of certified independent testing laboratories. In addition, the Contractor shall pay for all retests required due to failure to meet specifications.
  - 1) The certified independent testing laboratories qualifications, test procedures, forms and quality control program shall be submitted to the Utilities Engineer for review and approval.
  - 2) No failure of test agencies, whether engaged by the Owner or Contractor, to perform adequate inspections or tests or to properly analyze or report results, shall relieve the Contractor of responsibility for the fulfillment of the requirements of the Contract Documents. It is recognized that the required inspection and testing program is intended to assist the Contractor, Owner, Engineer and governing authorities in the nominal determination of probable compliances with requirements for certain crucial elements of work. The program is not intended to limit the Contractor in his regular quality control program, as needed for general assurance of compliances.
- (ii) Afford access and reasonable time in the construction sequence for Owner's inspections and tests to be performed. Cooperate with agencies and provide incidental labor and services needed for the removal and delivery of test samples, and for inspections and taking measurements. Provide patching and restoration services where test samples have been removed.

##### **(B) Test Agency Responsibilities:**

- (i) Test agencies, regardless of whether engaged by the Owner or Contractor, are not authorized to change or negate the requirements of the Contract Documents. Each agency shall coordinate its assigned work with the construction schedule as maintained by the Contractor, and shall perform its work promptly so as not to delay the work avoidably.

Observations (by agencies) having a bearing on the work shall be reported to the Engineer, in the most expeditious way possible, and shall be recorded in writing by the agency. Agency personnel shall not interfere with or assume the duties of the Contractor.

## **Part II. PRODUCTS**

### **2.01 EQUIPMENT AND MATERIALS**

- (A) All equipment and materials furnished under these specifications shall be new and unused.

## **Part III. EXECUTION**

### **3.01 INSTALLATION**

- (A) Pre-Installation Conferences:

- (i) Well in advance of the installation of every major unit of work which requires coordination with other work, meet at the project site with installers and representatives of manufacturers and fabricators who are involved in or affected by the unit of work, and in its coordination or integration with other work which has preceded or will follow. Advise Engineer of scheduled meeting dates. At each meeting, review the progress of other work and preparations for the particular work under consideration including, but not limited to, the requirements of the Contract Documents, options, related change orders, purchases, deliveries, shop drawings, product data, quality control samples, possible conflicts, compatibility problems, time schedules, weather limitations, temporary facilities, space and access limitations, structural limitations, governing regulations, safety, inspection and testing requirements, required performance results, recording requirements, and protection. Record the significant discussions of each conference, and the agreements and disagreements, along with the final plan of action. Distribute record of meeting promptly to everyone concerned, including the Engineer.
- (ii) The Contractor shall not proceed with the work if the associated pre-installation conference cannot be concluded successfully. Instigate actions to resolve impediments to the performance of the work, and reconvene the conference at the earliest date feasible.

- (B) Installer's Inspection of Conditions:

- (i) The Contractor shall require the Installer of each major unit of work to inspect the substrate to receive the work, and the conditions under which the work will be performed, and to report (in writing to the Contractor) unsatisfactory conditions. The Contractor shall not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

### **3.02 INSTALLATION QUALITY CONTROL**

- (A) **Manufacturer's Instructions:**

- (i) Where installations include manufactured products, the Contractor shall comply with the manufacturer's applicable instructions and recommendations for installation, to whatever extent these are more explicit or more stringent than applicable requirements indicated in the Contract Documents.

- (B) The Contractor shall inspect each item of materials or equipment immediately prior to installation, and reject damaged and defective items.
  - (i) The Contractor shall provide attachment and connection devices and methods for securing work properly as it is installed; true to line and level, and within recognized industry tolerances if not otherwise indicated. Allow for expansions and building movements. Provide uniform joint widths in exposed work, organized for best possible visual effect. Refer questionable visual effect choices to Engineer for final decision.
  - (ii) The Contractor shall recheck measurements and dimensions of the work, as an integral step of starting each installation.
  - (iii) The Contractor shall install work during conditions of temperature, humidity, exposure, forecasted weather, and status of project completion which will ensure the best possible results for each unit of work, in coordination with the entire work. Isolate each unit of work from incompatible work, as required to prevent deterioration.
  - (iv) The Contractor shall coordinate enclosure (closing-in) of work with required inspections and tests, so as to avoid the necessity of uncovering work for that purpose.
- (C) Mounting Heights:
  - (i) Except as otherwise indicated, the Contractor shall mount individual units of work at the industry-recognized standard mounting heights, for the applications indicated. Refer questionable mounting height choices to the Engineer for final decision.
- (D) Adjust, clean, lubricate, restore marred finishes, and protect newly installed work, to ensure that it will remain without damage or deterioration during the remainder of the construction period.

END OF SECTION

## SECTION 01410

### REGULATORY REQUIREMENTS

#### PART 1 GENERAL

##### 1.01 Section Includes

Regulatory requirements, project permits

##### 1.02 Related Sections

- A. Section 00700 - General Conditions
- B. Section 00800 - Supplementary Conditions
- C. Supplementary Conditions (Construction) Exhibit WWFS-04Li

This section is contained in the Project Manual after Section 00800 – Supplementary Conditions and is commonly know as FDEP SRF Supplementary Conditions. See page FDEP-4 for application.

- D. Section 01415 - Stormwater Pollution Prevention / NPDES Requirements

##### 1.03 Requirements of Regulatory Agencies

- A. All piping installed within the right-of-way of any city, county, state, or federal highway or railroad shall be in accordance with a permit to construct issued by the controlling agency and obtained by the Owner. In no case shall an open trench be constructed within a railroad right-of-way unless otherwise indicated.
- B. Whenever the Drawings and Specifications conflict with the requirements of the permit, then the requirements of the permit shall govern and the cost of abiding by the provisions of the permit shall be considered incidental to the Contract.
- C. All electrical apparatus and wiring pertaining to a piece of equipment or an appliance furnished and installed under this Contract shall comply with the National Electrical Code and shall be listed by Underwriters Laboratories or bear the approval of a recognized Testing Laboratory approved by the Engineer.
- D. All construction projects 1 or more acres in size that discharge to offsite areas are required to abide by the provisions of the National Pollution Discharge Elimination System (NPDES) General Permit.

##### 1.04 Project Permits

- A. The following permits have been obtained for the construction of the project, and are contained in the Appendix of the Project Manual:
  - 1. FDEP Permit

- B. The Contractor shall review and become familiar with all permits for the Project, complete with all conditions, attachments, exhibits and permit modifications. A copy of all permits for the Project shall be maintained by the Contractor at the project site, and shall be available for review upon request.
- C. The Contractor shall be fully responsible to abide by all provisions of the permits. The Contractor is responsible for the selection, implementation and operation of all measures required by the permits, including the maintenance of said measures as necessary during construction. No additional compensation will be allowed for any work associated with permit requirements.

### **1.05 Additional Laws**

- A. The Contractor shall comply with all laws applicable to the Work. Without limiting the generality of the foregoing, the Contractor certifies that it has complied, as appropriate, and will comply with the following requirements listed below in performing the Work.
- B. Requirements under the Florida Department of Environmental Protection State Revolving Fund program:
  - 1. The Archaeological and Historic Preservation Act of 1974, PL 93-291, and the National Historic Preservation Act of 1966, PL 89-665, as amended, regarding identification and protection of historic properties.
  - 2. The Clean Air Act, 42 U.S.C. 7506(c), which requires conformance with State Air Quality Implementation Plans.
  - 3. The Coastal Zone Management Act of 1972, PL 92-583, as amended, which requires assurance of project consistency with the approved State management program developed under this Act.
  - 4. The Endangered Species Act, 16 U.S.C. 1531, et seq., which requires that projects avoid disrupting threatened or endangered species and their habitats.
  - 5. Executive Order 11593, Protection and Enhancement of the Cultural Environment, regarding preservation, restoration and maintenance of the historic and cultural environment.
  - 6. Executive Order 11988, Floodplain Management, related to avoiding, to the extent possible, adverse impacts associated with floodplain occupancy, modification and development whenever there is a practicable alternative.
  - 7. Executive Order 11990, Protection of Wetlands, related to avoiding, to the extent possible, adverse impacts associated with the destruction or modification of wetlands and avoiding support of construction in wetlands.
  - 8. The Fish and Wildlife Coordination Act, PL 85-624, as amended, which requires that actions to control natural streams or other water bodies be undertaken to protect fish and wildlife resources and their habitats.
  - 9. The Safe Drinking Water Act, Section 1424(e), PL 93-523, as amended, regarding protection of underground sources of drinking water.



10. The Wild and Scenic Rivers Act, PL 90-542, as amended, related to protecting components or potential components of the national wild and scenic rivers system.
11. The federal statutes relating to nondiscrimination, including: The Civil rights Act of 1964, PL 88-352, which prohibits discrimination on the basis of race, color or national origin; the Age Discrimination Act, PL 94-135, which prohibits discrimination on the basis of age; Section 13 of the Federal Water Pollution Control Act, PL 92-500, which prohibits sex discrimination; the Rehabilitation Act of 1973, PL 93-112, as amended, which prohibits discrimination on the basis of handicaps.
12. Executive Order 11246, Equal Employment Opportunity, which provides for equal opportunity for all qualified persons.
13. Executive Orders 11625 and 12138, Women's and Minority Business Enterprise, which require that small, minority, and women's business and labor surplus areas are used when possible as sources of supplies, equipment, construction and services.
14. The Coastal Barrier Resources Act, 16 U.S.C. 3501 et seq., regarding protection and conservation of the coastal barrier resources.
15. The Farmland Protection Policy Act, 7 U.S.C. 4201 et seq., regarding protection of agricultural lands from irreversible loss.
16. The Uniform Relocation and Real Property Acquisition Policies Act of 1970, PL 91-646, which provides for fair and equitable treatment of persons displaced or whose property is acquired as a result of federal or federally assisted programs.
17. The Demonstration Cities and Metropolitan Development Act of 1966, PL 89-754, as amended, which requires that projects be carried out in accordance with area wide planning activities.
18. Section 306 of the Clean Air Act, Section 508 of the Clean Water Act and Executive Order 11738, which prohibit manufacturers, firms, or other enterprises on the EPA's list of Violating Facilities from participating in the Project.
19. Executive Order 12549, Debarment and Suspension, which prohibits any award to a party which is debarred or suspended or is otherwise excluded from, or ineligible for, participation in federal assistance programs.
20. Minority and Women's Business Enterprise participation in project work using numerical goals, established by the U.S. Environmental Protection Agency, and to be set forth in the specifications for construction and materials contracts.
21. Chapter 161, Part I, F.S., "Beach and Shore Preservation Act" and Part III, "Coastal Zone Protection Act of 1985" which regulate coastal zone construction and all activities likely to affect the condition of the beaches or shore.
22. Chapter 253, F.S., "Emergency Archaeological Property Acquisition Act of 1988" which requires protection of archaeological properties of major statewide significance discovered during construction activities.
23. Chapter 258, Part III, F.S., which requires protection of components or potential components of the national wild and scenic rivers system.
24. Chapter 267, F.S., the "Florida Historical Resources Act" which requires identification, protection, and preservation of historic properties, archaeological and anthropological sites.

25. Chapter 287, Part I, F.S., which prohibits parties convicted of public entity crimes or discrimination from participating in State-assisted projects and which requires consideration of the utilization of Minority Business Enterprises in State-assisted projects.
  26. Chapter 372, F.S., the Florida Endangered and Threatened Species Act which prohibits the killing or wounding of an endangered, threatened, or special concern species or intentionally destroying their eggs or nest.
  27. Chapter 373, Part IV, F.S., Florida Water Resources Act of 1972, which requires that activities on surface waters or wetlands avoid adversely affecting: public health, safety, welfare, or property; conservation of fish and wildlife, including endangered or threatened species or their habitats; navigation or the flow of water; the fishing or recreational values or marine productivity; and significant historical and archaeological resources.
  28. Chapter 380, Part I, F.S., Florida Environmental Land and Water Management Act of 1972 as it pertains to regulation of developments and implementation of land and water management policies.
  29. Chapter 381, F.S., Public Health, as it pertains to regulation of onsite wastewater systems.
  30. Chapter 403, Part I, F.S., Florida Air and Water Pollution Control which requires protection of all waters of the state.
  31. Chapter 582, F.S., Soil and Water Conservation Act which requires conformance with Water Management District's regulations governing the use of land and water resources.
  32. Governor's Executive Order 95-359, which requires State Clearinghouse review of project planning documentation and intergovernmental coordination.
- C. Requirements under the Army Corps of Engineers grant program (note that this program also requires compliance with the Davis Bacon Act, which is covered in another portion of the Agreement.
1. Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d) and Department of Defense Directive 5500.11 issued pursuant thereto;
  2. Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army"; and
  3. All applicable Federal labor standards requirements including, but not limited to, 40 U.S.C. 3141-3148 and 40 U.S.C. 3701-3708 (revising, codifying and enacting without substantive change the provisions of the Davis-Bacon Act (formerly 40 U.S.C. 276a *et seq.*), the Contract Work Hours and Safety Standards Act (formerly 40 U.S.C. 327 *et seq.*) and the Copeland Anti-Kickback Act (formerly 40 U.S.C. 276c)).

**PART 2 PRODUCTS - Not Used**

**PART 3 EXECUTION - Not Used**

**END OF SECTION**

## SECTION 01415

### STORMWATER POLLUTION PREVENTION / NPDES REQUIREMENTS

#### PART 1 GENERAL

##### 1.01 Section Includes

Stormwater Pollution Prevention Plan requirements and recommendations under the NPDES program.

##### 1.02 Purpose

The purpose of this section is to outline minimum requirements for stormwater pollution prevention as required under the NPDES program. There may be more stringent local government or Owner requirements for Erosion and Sediment Control, which would be located in the Specifications or on the Drawings. The more stringent requirement governs.

##### 1.03 Related Sections

- A. Section 01410 – Regulatory Requirements
- B. Section 02370 – Erosion and Sediment Control

##### 1.04 Abbreviations

- A. NPDES - National Pollution Discharge Elimination System
- B. SWPPP - Stormwater Pollution Prevention Plan
- C. NOI - Notice of Intent
- D. NOT - Notice of Termination

##### 1.05 Construction Projects Requiring Compliance with NPDES General Permit

All projects 1 or more acres in size that discharge to offsite areas.

##### 1.06 General Requirements

- A. The Contractor and all subcontractors involved with a construction activity that disturbs site soil or who implement a pollutant control measure identified herein must comply with the following requirements of the NPDES General Permit and any local governing agency having jurisdiction concerning erosion and sedimentation control.
- B. The Contractor is responsible for preparing a SWPPP and for completing and submitting the required NOI and NOT forms, and paying all associated fees. NOI and NOT forms, and permit application fee information are available for download at:

1. Projects located in Florida: [www.dep.state.fl.us/water/stormwater/npdes/](http://www.dep.state.fl.us/water/stormwater/npdes/)
  2. Projects located in Texas: [www.tnrcc.state.tx.us/permitting](http://www.tnrcc.state.tx.us/permitting)
  3. Projects located in Puerto Rico: [www.epa.gov/npdes/pubs/connoi.pdf](http://www.epa.gov/npdes/pubs/connoi.pdf)
- C. The SWPPP shall include the elements necessary to comply with the national baseline general permit for construction activities administered by the U.S. Environmental Protection Agency (EPA) or states designated to administer the EPA NPDES program, and shall also include all local governing agency and Owner requirements. There may be more stringent local government or Owner requirements for Erosion and Sediment Control, which would be located in the Specifications or on the Drawings.
- D. A copy of the NOI and a description of the project must be posted in a prominent place for public viewing at the construction site.
- E. The SWPPP must be implemented at the start of construction. A complete copy of the SWPPP, including copies of all inspection reports, plan revisions, etc., must be retained at the project site at all times during working hours and kept in the permanent project records for at least three years following submission of the NOT.
- F. The Contractor must provide names and addresses of all subcontractors working on this project who will be involved with the major construction activities that disturb site soil. That information must be part of the SWPPP.
- G. The Contractor and all subcontractors involved with the major construction activities that disturb site soil must sign a copy of the appropriate certification statement included herein.
- H. Regular inspections by the Contractor must be made to determine effectiveness of the SWPPP. The inspector must be a person familiar with the site, the nature of the major construction activities, and qualified to evaluate both overall system performance and individual component performance.
- I. The SWPPP must be updated each time there are significant modifications to the pollutant prevention system or a change of contractors working on the project who disturbs site soil. The Contractor must notify EPA or the local state agency administering the NPDES program as soon as these modifications are implemented.
- J. Discharge of oil or other hazardous substances into the storm water is subject to reporting and cleanup requirements. Refer to Part III.B of the NPDES General Permit for additional information. Copies of the NPDES General Permit are available for download at the sites listed in item B.
- K. Once the site reaches final stabilization, the general contractor must complete and submit the NOT to the required NPDES agency and the Owner.
- L. The SWPPP must be amended as necessary during the course of construction in order to keep it current with the pollutant control measures utilized at the site.

- M. A record of the dates when major grading activities occur, when construction activities temporarily or permanently cease on a portion of the site, and when stabilization measures are initiated must be maintained until the NOT is filed. Provide copies of these records to the Owner.
- N. The SWPPP must be implemented before construction begins on the site. The primary purpose of the SWPPP is to address the impact of storm rainfall and runoff on areas of the ground surface disturbed during the construction process. In addition, it shall include recommendations for controlling other sources of pollution that could accompany the major construction activities. The SWPPP will terminate when disturbed areas are stabilized, construction activities are completed, and the NOT has been filed.

### **1.07 Allowable Non Stormwater Discharges During Construction**

- A. The national baseline General Permit for Storm Water Discharges from Construction Activities prohibits most non-storm water discharges during the construction phase. Allowable non-storm water discharges that could occur during construction on this project, which would therefore be covered by the General Permit, include:
  - 1. Discharges from fire fighting activities
  - 2. Fire hydrant flushing
  - 3. Water used to wash vehicles or control dust
  - 4. Water flowing from potable sources and water line flushing
  - 5. Irrigation drainage
  - 6. Runoff from pavement wash down where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and where detergents have not been used
  - 7. Springs and uncontaminated groundwater

### **1.08 Minimum SWPPP Construction Guidelines**

- A. Construct rock pads for construction entrance/exit.
- B. Install sediment barriers down slope from construction activities that disturb site soil.
- C. Construct rock surface for temporary parking.
- D. Install sediment barriers on the down slope prior to clearing and grubbing.
- E. Install sediment barriers on the down slope side of utility construction and soil stockpiles.
- F. Install sediment barriers on the down slope from disturbed soil during grading activities.

### **1.09 SWPPP Site Data**

- A. Site Location - See Location Map. All construction activities are limited to Marathon Area 3 and 4 Wastewater Treatment Plant Sites.
- B. Site Topography: Site is relatively flat with elevations about 4' - 6' NGVD.
- C. Rainfall Information: Annual Average rainfall is 55 inches.
- D. Site Soils: Information is contained in the geotechnical report as Appendix A.
- F. Receiving Surface Waters: Atlantic Ocean and the Gulf of Mexico.

### **1.10 Minimum Erosion and Sediment Control**

- A. The primary technique to be used at this project for stabilizing site soil will be to provide a protective cover of turf grass or pavement.
- B. Within 14 days after construction activity ceases on any particular area, all disturbed ground where there will not be construction for longer than 21 days must be seeded with fast-germinating temporary seed and protected with mulch.
- C. All areas at final grade must be sodded or permanently seeded and mulched (as required by the Drawings) within 14 days after completion of the major construction activity. Final site stabilization is achieved when turf grass cover provides permanent stabilization for at least 70 percent of the disturbed soil surface, exclusive of areas that have been paved.
- D. Construction traffic must enter and exit the site at the stabilized construction entrance. The purpose is to trap dust and mud that would otherwise be carried off-site by construction traffic.
- E. Water trucks will be used as needed during construction to reduce dust generated on the site. Dust control must be provided by the Contractor and shall be in compliance with applicable local and state dust control regulations.
- F. No solid materials, including building materials, are allowed to be discharged from the site with storm water. All solid waste, including disposable materials incidental to the major construction activities, must be collected and placed in containers. The containers shall be emptied periodically by a contract trash disposal service and hauled away from the site.
- G. Substances that have the potential for polluting surface and/or groundwater must be controlled by whatever means necessary in order to ensure that they do not discharge from the site. As an example, special care must be exercised during equipment fueling and servicing operations. If a spill occurs, it must be contained and disposed so that it will not flow from the site or enter groundwater, even if this requires removal, treatment, and disposal of soil. In this regard, potentially polluting substances should be handled in a manner consistent with the impact they represent.

- H. All personnel involved with construction activities must comply with state and local sanitary or septic system regulations. Temporary sanitary facilities will be provided at the site throughout the construction phase. They must be utilized by all construction personnel and shall be serviced by a commercial operator.
- I. Non-storm water components of site discharge must be clean water. Water used for construction, which discharges from the site, must originate from a public water supply or private well approved by the State Health Department. Water used for construction that does not originate from an approved public supply must not discharge from the site.
- J. Chemicals, paints, solvents, fertilizers, and other toxic material must be stored in waterproof containers. Except during application, the contents must be kept in trucks or within storage facilities. Runoff containing such material must be collected, removed from the site, treated, and disposed at an approved solid waste or chemical disposal facility.
- K. Between the time the SWPPP is implemented and final site stabilization is achieved, all disturbed areas and pollutant controls must be inspected at least once every seven calendar days and within 24 hours following a rainfall of 0.5 inches or greater. The inspections are to be conducted by the Contractor's designated representative.
- L. Sediment barriers must be inspected and, if necessary, they must be enlarged or cleaned in order to provide additional capacity. All material excavated from behind sediment barriers shall be stockpiled on the up slope side. Additional sediment barriers shall be constructed as needed.
- M. All discharge points must be inspected to determine whether erosion control measures are effective in preventing significant impacts to receiving waters.
- N. Based on inspection results, any modification necessary to increase effectiveness of this SWPPP to an acceptable level must be made within seven calendar days of the inspection. The inspection reports must be completed entirely and additional remarks should be included if needed to fully describe a situation. An important aspect of the inspection report is the description of additional measures that need to be taken to enhance plan effectiveness. The inspection report must identify whether the site was in compliance with the SWPPP at the time of inspection and specifically identify all incidents of non-compliance.
- O. Inspection reports must be kept on file by the Contractor as an integral part of this SWPPP for at least three years from the date of completion of the project.
- P. It is the responsibility of the Contractor to assure the adequacy of site pollutant discharge controls.

**CONTRACTOR  
CERTIFICATION**

The Contractor and/or subcontractor(s) that will implement the pollutant control measures described in the SWPPP must be identified below. Each must sign a statement certifying that they understand the NPDES general permit authorizing storm water discharges during construction. These statements must be maintained in the SWPPP file on site.

Contractor implementing the SWPPP:

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Business Name

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Business Address

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Business Telephone Number

CERTIFICATION: (Note signature requirements in Part VI.G. of the NPDES General Permit.)

***"I certify under penalty of law that I understand the terms and conditions of the general National Pollutant Discharge Elimination System (NPDES) permit that authorizes the storm water discharges associated with industrial activity from the construction site identified as part of this certification."***

---

Signature

Date

---

Printed Name



**PART 2 PRODUCTS – Not Used**

**PART 3 EXECUTION – Not Used**

**END OF SECTION**

## SECTION 01510

### TEMPORARY UTILITIES

#### PART 1 GENERAL

##### 1.1 GENERAL REQUIREMENTS

All permissions and requirements of the Work described in this section shall not be special or extra pay items but included in the lump sum project cost.

##### 1.2 TEMPORARY LIGHT

The Contractor shall provide temporary lighting facilities for the proper prosecution and inspection of the work. These facilities shall be installed and maintained by the Contractor and shall be located in such a manner as to result in the least interference with work upon the project site and existing facilities.

##### 1.3 TEMPORARY POWER

The Contractor shall provide temporary power facilities required for the proper prosecution and inspection of the work. These facilities shall be installed and maintained by the Contractor, and shall be located in such a manner as to result in the least interference with work upon the project site and existing facilities. Temporary power facilities shall remain in place after completion of construction until final acceptance of the work. After final acceptance of the work, the Contractor shall remove temporary power facilities.

##### 1.4 TEMPORARY WATER

The Contractor shall make the necessary arrangements for securing and transporting all water required in the construction, including water required for mixing of concrete, sprinkling, testing, flushing, flooding or jetting and including any temporary pipeline or equipment which may be necessary to make use of such water.

##### 1.5 POTABLE WATER

The Contractor shall be responsible for furnishing a supply of potable drinking water for employees, subcontractors, inspectors, Engineers and the Owner who are associated with the work progress.

##### 1.6 TEMPORARY TELEPHONE SERVICE

Provide telephone service, for the duration of the project, at the Contractor's field office.

#### 1.7 SANITARY FACILITIES

The Contractor will provide sufficient sanitary facilities in proximity to the areas of work for his employees and those employees of his subcontractors. The Contractor will be responsible for continual maintenance and servicing of these facilities.

#### 1.8 FIRST AID FACILITIES

The Contractor shall maintain, at a well-known place at the job site, all articles necessary for giving first aid to the injured, and shall make standing arrangements for the immediate removal to a hospital or a doctor's care of persons (including employees) who may be injured on the job site. In no case, shall employees be permitted to work at a job site before the employer has made a standing arrangement (verified in writing to the Owner) for removal of injured persons to a hospital or a doctor's care.

END OF SECTION

SECTION 01540  
JOB SECURITY

PART 1 GENERAL

1.1 BARRICADES, LIGHT, AND WATCHMEN

- A. The Contractor shall furnish and erect such barricades, fences, lights, and danger signals, shall provide such watchmen, and shall provide such other precautionary measures for the protection of persons or property and of the work as are necessary. Barricades shall be painted in a color that will be visible at night. From sunset to sunrise, the Contractor shall furnish and maintain at least one light at each barricade and sufficient numbers of barricades shall be erected to keep vehicles from being driven on or into any work under construction. The Contractor shall furnish watchmen in sufficient numbers to protect the work.
- B. The Contractor will be held responsible for all damage to the work due to failure of barricades, signs, lights, and watchmen to protect it and whenever evidence is found of such damage, the Contractor shall immediately remove the damaged portion and replace it at his cost and expense. The Contractor's responsibility for maintenance of barricades, signs, and lights and for providing watchmen shall not cease until the project has been accepted by Owner.

END OF SECTION

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## SECTION 01610

### GENERAL EQUIPMENT STIPULATIONS

#### PART 1 GENERAL

##### 1.1 SCOPE

These "General Equipment Stipulations" apply, in general, to all equipment and piping. They supplement the detailed equipment specifications, but in case of conflict, the detailed equipment specifications shall govern.

##### 1.2 COORDINATION

The Contractor shall assume full responsibility for the coordination of the installation of all equipment, materials, and products furnished under these Contract Documents. The Contractor shall be completely responsible for verification that all structures, piping, and equipment components furnished by him and/or his Subcontractors and Suppliers are compatible. The Contractor shall start up each equipment system and shall make all necessary adjustments to place each system in proper operating condition.

##### 1.3 ADAPTATION AND LOCATION OF EQUIPMENT

- A. Equipment shall be readily adaptable for installation and operation in the structures to be constructed under other Contracts. No responsibility for alteration of a planned structure to accommodate other types of equipment will be assumed by the Owner. Equipment that requires alteration of the structures will be considered only if the Contractor assumes all responsibility for making and coordinating all necessary alterations. All such alterations shall be made at the Contractor's expense.
- B. The Contractor shall install the work in such manner that the equipment, piping, vents, conduit, panels, and ductwork, etc., will be as neatly installed and out-of-the-way as physically possible. All equipment, piping, ductwork, and conduit, etc., shall be installed to provide needed maintenance and passage space.

##### 1.4 PATENT ROYALTIES

All royalties and fees for patents covering materials, articles, apparatus, devices, or equipment shall be included in prices bid by the Contractor. Attention is directed to the requirements of the "Supplemental General Conditions" concerning patents.

##### 1.5 EQUIPMENT GUARANTEE

The Contractor shall guarantee all equipment against faulty or inadequate design, improper assembly or erection, defective materials, breakage or other failure. The Contractor shall guarantee all equipment against improper assembly or erection, defective workmanship or other failure. The guarantee period shall be defined in the Section 01730 "Guarantees and Warranties" of these Specifications.

## 1.6 WORKMANSHIP AND MATERIALS

- A. All equipment shall be designed, fabricated, and assembled in accordance with the best modern engineering and shop practice. Individual parts shall be manufactured to standard sizes and gauges so that repair parts, furnished at any time, can be installed in the field. Like parts of duplicate units shall be interchangeable. Equipment shall be new and shall not have been in service at any time prior to delivery, except as required by tests. All bolts, nuts, fastenings, pipe, and fittings shall be manufactured in conformance with the United States system of measurement.
- B. Materials shall be suitable for service conditions. Iron castings shall be tough, close grained, gray iron free from blowholes, flaws, or excessive shrinkage and shall conform to ASTM A 48, Class 30 minimum. Plugging of defective castings shall not be permitted. Castings shall be annealed to remove internal stresses prior to machining and shall have the mark number and heat number cast on them.
- C. Except where otherwise specified, structural and miscellaneous fabricated steel used in items of equipment shall conform to the standards of the American Institute of Steel Construction. All structural members shall be considered as subject to shock or vibratory loads.
- D. All replaceable or expendable elements such as filters, screens, drive belts, fuses, and indicator lamps, etc., shall be easily accessible and replaceable without need of dismantling equipment or piping. All such items shall be of a standard type that is readily available from multiple suppliers.
- E. Threaded openings for drains or vents in pump volutes, compressor or fan scrolls, air receivers, and heat exchangers which are plugged during normal operation shall be provided with stainless steel plugs.

## 1.7 LUBRICATION

- A. Equipment shall be adequately lubricated by systems which require attention no more frequently than weekly during continuous operation. Lubrication systems shall not require attention during startup or shutdown and shall not waste lubricants.
- B. Lubricants of the type recommended by the equipment manufacturer shall be provided in sufficient quantity by the Contractor to fill all lubricant reservoirs and to replace all lubricants consumed during testing, startup, and initial operation. The Contractor shall provide sufficient quantities of lubricants to lubricate all equipment for one year of normal service before final acceptance of the equipment will be made by the Owner.
- C. Where special run-in oil or storage lubricants are used, they shall be flushed out and replaced with the required service lubricant by the Contractor.
- D. Tag each piece of equipment with cloth tag showing proper type lubricant, period between lubrications, date of lubrication, and worker's initials. Have space for ten lubrication notations.

## 1.8 ELECTRIC MOTORS

- A. Unless otherwise required by the detailed equipment specifications, motors furnished with equipment shall comply with the following:
1. Motors shall be designed and applied in compliance with NEMA, ANSI, IEEE, and AFBMA standards and the NEC for the specific duty imposed by the driven equipment.
  2. Where frequent starting occurs, motors shall be designed for frequent starting duty equivalent to the duty service required by the driven equipment.
  3. Unless recognized and defined by the standards and codes for intermittent duty as a standard industry practice, all motors shall be rated for continuous duty at 40°C ambient. Motor temperature rise above 40°C ambient on continuous operation at nameplate horsepower shall not exceed the NEMA limit for 1.0 service factor and Class B insulation, or Class A insulation if used.
  4. Motors shall be designed for full voltage starting. Motors shall operate under a 10 percent voltage variation and 5 percent frequency variation.
  5. Motor-bearing life shall be based upon the actual operating load conditions imposed by the driven equipment.
  6. Motors shall be sized for the altitude at the location where the equipment is to be installed.
  7. Motors shall be sized so that, under maximum continuous load imposed by the driven equipment, the motor nameplate horsepower for continuous operation in 40°C ambient is at least 15 percent more than the driven load. Continuous equipment load shall not exceed 87 percent of motor nameplate horsepower, whether motor service factor is 1.0 or higher.
  8. Where the detailed specifications call for encapsulated motor windings, the motor shall have a sealed insulation system designed for a more severe environment than usual varnish treatments can withstand. The insulation system shall be General Electric "Polyseal," Allis-Chalmers "PoXeal," U. S. Motors "Everseal," or equal. Motors in this case may be single voltage rated.
  9. Motors shall have a clamp-type grounding terminal inside the motor conduit box.
  10. Motors with external conduit boxes shall have oversized conduit boxes.
  11. Motors in occupied areas shall be quiet rated and so marked.
- B. It is the intent of this general specification to allow the manufacturer's standard motor on integrally constructed, motor-driven equipment such as appliances, hand tools, etc., that is specified by model number in which a redesign of the complete unit would be required for a motor with other features as may be specified herein.
- C. Unless otherwise required by the detailed equipment specifications, motors within the horsepower ranges indicated below shall be rated and constructed as follows:
1. Below 1/2 horsepower:
    - a. 115-volt, 60-hertz, single phase.
    - b. Totally enclosed, fan-cooled.
    - c. Permanently lubricated, sealed bearings.
    - d. Built-in manual-reset thermal protector; or furnished with integrally mounted stainless steel enclosed manual motor-overload switch.



2. 1/2 to 1 horsepower:
  - a. 230/460-volt, 60-hertz, 3-phase.
  - b. Totally enclosed, fan cooled.
  - c. Specially insulated for use in damp locations below 20°C.
  - d. Grease-lubricated, antifriction bearings.
3. 1-1/2 horsepower and above:
  - a. 230/460-volt, 60-hertz, 3-phase.
  - b. Totally enclosed, fan-cooled.
  - c. Specially insulated for use in damp locations below 20°C.
  - d. Grease-lubricated antifriction bearings or oil-lubricated sleeve bearings.
  - e. Vertical motors shall have 15-year average-life thrust bearings.

## 1.9 DRIVE UNITS

- A. Except when specified otherwise in the detailed equipment specifications, 87 percent of the nameplate horsepower rating of each drive motor shall be at least equal to the theoretical brake horsepower required to drive the equipment under full load, including all losses in speed reducers and power transmission.
- B. The nominal input horsepower rating of each gear or speed reducer shall be at least equal to the nameplate horsepower of the drive motor.
- C. Drive units shall be designed for 24-hour continuous service and shall be constructed so that oil leakage around shafts is precluded.
- D. Gear Motors: Gear motors shall be rated AGMA Class II and shall bear an AGMA nameplate.
- E. Gear Reducers: Each gear reducer shall be totally enclosed, oil lubricated, with antifriction bearings throughout. Worm gear reducers shall have a service factor of at least 1.25. Shaft-mounted gear reducers shall be rated AGMA Class II. Other helical, spiral bevel, and combination bevel-helical gear reducers shall have a service factor of at least 1.40. Each gear reducer shall bear an AGMA nameplate or the manufacturer shall certify that the gear reducer is designed and rated in accordance with AGMA standards.
- F. Chain Drives: Chain drives shall utilize roller chain having an ultimate strength of not less than 10 times the maximum working load.
- G. V-Belt Drives: Each V-belt drive shall include a sliding base or other suitable tension adjustment. Fixed ratio V-belt drives shall have a service factor of at least 1.5 based on motor nameplate horsepower.
- H. Couplings: Couplings between motors and drives or between drives and the driven equipment shall have a service factor of not less than 1.25 based on motor nameplate horsepower. Couplings between drives and the driven equipment shall have a service factor not less than that of the drive based on motor nameplate horsepower. All couplings rotating at speeds less than 900 rpm shall be of all steel construction. In general, couplings shall be of the tapered grid steel spring type or the crowned gear type.

- I. Overtorque Protection: All low speed, high torque drives for equipment such as mechanical screens, conveyors, and clarifier and thickener mechanisms shall be protected against excessive torque by means of a suitable overtorque protection device. Acceptable devices shall include torque switches, shear pins, shear keys, and full-release torque couplings. Torque limiting couplings using sliding surfaces or friction to limit torque shall not be used.

#### 1.10 SAFETY GUARDS

All belt or chain drives, fan blades, couplings, and other moving or rotating parts shall be covered on all sides by a safety guard. Safety guards shall be fabricated from 16 USS gauge or heavier galvanized or aluminum-clad sheet steel or 1/2-inch mesh galvanized expanded metal. Each guard shall be designed for easy installation and removal. All necessary supports and accessories shall be provided for each guard. Supports and accessories, including bolts, shall be galvanized. All safety guards in outdoor locations shall be designed to prevent the entrance of rain and dripping water. All safety guards shall comply with OSHA General Industry Standards, Part 1910, Subpart O, "Machinery and Machine Guarding." Provide tachometer access on shaft ends.

#### 1.11 ANCHOR BOLTS

- A. Equipment suppliers shall furnish suitable anchor bolts for each item of equipment. Anchor bolts, together with templates or setting drawings, shall be delivered sufficiently early to permit setting the anchor bolts when the structural concrete is placed. Two nuts and two washers shall be furnished for each bolt. Anchor bolts to be embedded in concrete shall be provided with sufficient threads to permit a nut and washer to be installed on the concrete side of the concrete form or supporting template, but in no case shall bolts be threaded less than 2 inches. Anchor bolts used in anchoring rotating or vibrating equipment shall be provided with suitable lock washers.
- B. Unless otherwise shown or specified, anchor bolts for items of equipment mounted on baseplates shall be long enough to permit a minimum of one inch of grout beneath the baseplate and to provide adequate anchorage into structural concrete. Individual, embedded anchor bolts for heavy equipment shall be centered in a steel pipe sleeve having an inside diameter approximately two times the bolt diameter and an embedded length approximately 8 times the bolt diameter.
- C. Bolts specified to be bent shall be bent cold. Bend radius shall not be less than twice the bolt diameter. Unless otherwise shown or specified, anchor bolts shall be embedded in concrete a minimum distance of 15 times the bolt diameter. Unless otherwise shown or specified, all anchor bolts shall be at least 1/2-inch in diameter.
- D. All embedded anchor bolts or anchor bolt materials shall be ASTM A 193, Grade B8, ASTM A 276, Type 304, or IFI-104, Grade 304 stainless steel threaded per ANSI B1.1. Nuts shall be heavy hex nuts, ANSI B18.2, semifinished pattern, and shall be ASTM A 194, Grade 8 or IFI-104, Grade 304 stainless steel. Flat washers shall be 18-8 stainless steel and shall conform to ANSI B27.2.
- E. Expansion anchors shall be used to anchor equipment to existing concrete. Expansion anchors shall be stainless steel, Type 304 and shall be of the wedge type for use in bottomless holes.

Expansion anchors shall conform to the applicable requirements of Federal Specification FF-S-325. Installation methods shall be in conformance with the manufacturer's recommendations for maximum pullout and shear strength, but in no case shall the depth of the hole be less than 8 bolt diameters or 3 inches, whichever is greater. The minimum distance between the center of any expansion anchor and an edge or exterior corner of concrete shall not be less than 5 times the diameter of the hole in which it is installed. The minimum distance between adjacent anchors shall not be less than 10 times the diameter of the hole in which it is installed. Expansion anchors shall be "Phillips Red Head" by Phillips Drill Company, "Kwik-Bolt" by Hilti Fastening Systems, "Trubolt" by Ramset Fastening Systems, or equal.

#### 1.12 EQUIPMENT BASES

- A. Where shown on the Drawings, equipment shall be installed on a raised reinforced concrete base. The base shall be a minimum of 4 inches in height and shall extend beyond the equipment baseplate approximately 2 inches on all sides.
- B. The electrical contractor shall be instructed concerning electrical conduit locations prior to pouring the concrete base.
- C. Unless otherwise specified, a cast iron or welded steel baseplate shall be provided for each pump, compressor, and any other item of equipment which is to be installed on a concrete base. Each unit and its drive assembly shall be supported on a single baseplate of neat design. Baseplates shall have pads for anchoring all components and adequate grout holes. Baseplates for pumps shall have a raised lip all around and a threaded drain connection. Baseplates shall be anchored to the concrete base with suitable anchor bolts and the space beneath filled with epoxy or non-shrink grout as specified in the grouting section.
- D. On direct coupled equipment, motor and driven equipment shall be doweled to a common base with a minimum of two dowels each.

#### 1.13 ALIGNMENT OF MOTORS AND EQUIPMENT

- A. In every case where a drive motor is connected to a driven piece of equipment by a flexible coupling, the coupling halves shall be disconnected and the alignment between the motor and the equipment checked and corrected. Machinery shall first be properly aligned and leveled by means of steel wedges and shims or jacking screws near anchor bolts. Anchor bolts shall be tightened against the shims on wedges or jacking screws and the equipment shall again be checked for level and alignment before placing grout. Wedges shall not be placed between machined surfaces.
- B. In general, checking and correcting the alignment shall follow the procedures set up in the Standards of the Hydraulic Institute, "Instructions for Installation, Operation, and Maintenance of Centrifugal Pumps." Equipment shall be properly leveled and brought into angular and parallel alignment.
- C. Equipment shall be installed in such a way that no strain is transmitted to the equipment by piping systems or adjacent equipment.

#### 1.14 LUBRICATION FITTINGS

Except for rotating shaft couplings, all lubrication fittings shall be brought to the outside of all equipment so that they are readily accessible from the outside without the necessity of removing covers, plates, housings, or guards. Fittings shall be accessible from safe, permanent platforms or walk areas. Fittings shall be of the bull-neck, check type for use with a portable high pressure grease gun. Connection from a remote fitting to the point of use shall be with minimum 3/16-inch stainless steel tubing, securely mounted parallel to equipment lines and protected where exposed to damage.

#### 1.15 GROUTING

A special epoxy, non-shrink, or sand-cement grout shall be used in the placement of all pump, motor, and equipment baseplates or bedplates, column baseplates, other miscellaneous baseplates, and other grouting applications as shown on the Drawings. Grouting materials and installation shall be as specified in the Section 03602 "Nonmetallic Grouting" of these Specifications and Contract Documents.

#### 1.16 WELDING AND BRAZING

- A. All welds shall be sound and free from embedded scale and slag. All butt welds shall be continuous and where exposed to view shall be ground smooth. All continuous welds shall be gas and liquid-tight. Welds in piping shall have full penetration and shall be smooth on the inside of the pipe. Intermittent welds shall have an effective length of at least 2 inches and shall be spaced not more than 6 inches apart.
- B. All welding of steel and aluminum, including materials, welding techniques, general safety practices, appearance and quality of welds, and methods of correcting defective work, shall conform to the latest requirements of AWS Specifications. Structural steel welding shall conform to the requirements of the AWS "Structural Welding Code." The general recommendations and requirements of the AWS "Structural Welding Code" shall also apply to welded aluminum structures. The welding process and welding operators shall meet qualification tests and welding performance tests in accordance with the latest provisions of ASME Boiler and Pressure Vessel Code, Section IX, "Welding and Brazing Qualifications." Welding process and qualification procedures for welding of pipe shall conform to the latest requirements of ANSI B31.1, Section 327, "Welding," and Section 328, "Brazing and Soldering." All welding qualification tests shall be witnessed by the Engineer, except as provided herein. All costs associated with the qualification or testing of welders and welding operators shall be borne by the Contractor.
- C. Actual welding procedures to be used in field assembly and installation of equipment furnished under this Contract shall be submitted to the Engineer for approval prior to beginning the work. Reports certifying that the welding procedures, welders, and welding operators that the Contractor intends to use are qualified as specified above shall also be submitted to the Engineer prior to beginning the work. In the case of welder qualifications for shop welding and for carbon steel field welding, welders presenting certified qualification papers validated within the preceding 6-month period and acceptable to the Engineer will not be required to take the qualification tests. In the case of field welding of stainless steel or

aluminum, all welders shall be required to take the qualification tests regardless of past experience or availability of certified qualification papers.

- D. Field welding practices shall conform to OSHA Construction Standards, Part 1926, Subpart J, "Welding and Cutting." Shop welding practices shall conform to OSHA General Industry Standards, Part 1910, Subpart Q, "Welding, Cutting, and Brazing."
- E. Welding electrodes for structural steel shall conform to the standard recommendations of the AISC. Welding electrodes for stainless steel shall conform to applicable AWS specifications and shall be as recommended by "Welded Austenitic Chromium-Nickel Stainless Steels, Techniques and Properties," published by the International Nickel Company, New York, New York. Welding electrodes for aluminum shall conform to applicable AWS specifications.
- F. Each welder and welding operator must identify his welds with his assigned symbol.
- G. Welders performing unsatisfactory work shall be removed from the welding process.
- H. The Owner may inspect any weld by radiographic or other means. Welds not in accordance with the requirements specified herein shall be repaired or replaced at the Contractor's expense. Excessive porosity, nonmetallic inclusions, lack of fusion, incomplete penetration, and cracking shall constitute grounds for rejection of welds.

#### 1.17 ERECTION AND SETTING

- A. In the erection and setting of all fabricated equipment, the Contractor shall exercise care to ensure that each item of equipment is adequately supported so as not to bend or distort under its own weight until adequate foundation support and anchorage are provided. Where lifting lugs or clips are provided, they shall be used in erecting and setting the equipment. Erection and setting of equipment and structural steel shall conform to the requirements of OSHA Construction Standards, Part 1926, Subpart R, "Steel Erection," Subpart H, "Material Handling, Storage, Use, and Disposal," and Subpart N, "Cranes, Derricks, Hoists, and Conveyors." Erection of structural steel shall conform to the latest requirements of the AISC "Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings."
- B. During placement and prior to any grouting or connection of adjacent piping the equipment shall be leveled and aligned true to level, plumb, alignment, and grade with all parts bearing or fitting the structure or equipment accurately and securely. It shall not be permitted to cock out of alignment, redrill, reshape, or force fit any fabricated items.
- C. The Contractor shall take all measurements necessary to properly fit his work in the field, and he shall be governed by and responsible for these measurements and the proper working out of all details. The Contractor shall be responsible for the correct fitting of all work in the field and the accurate placement of all anchor bolts installed by him.
- D. The Contractor shall bring all parts to be erected or assembled into close contact. Before assembly, all surfaces to be in contact with each other shall be thoroughly cleaned. Drift pins may be used only for bringing members into position, never to enlarge or distort holes. Torching or burning of holes or cutting of fabricated items to correct misalignment or shop

errors shall not be permitted. Enlargement of holes necessary to make field connections shall be done only with the Engineer's approval by reaming with twist drills and in a manner acceptable to the Engineer.

- E. All equipment shall be furnished with suitable eyebolt lifting lugs or lifting angles to facilitate handling.

#### 1.18 SPECIAL TOOLS AND ACCESSORIES

Equipment requiring periodic repair and adjustment shall be furnished complete with all special tools, instruments, and accessories required for proper maintenance. Special tools and accessories shall include those tools and accessories not normally available in an industrial hardware or mill supply house. Equipment requiring special devices for lifting or handling shall be furnished complete with those devices.

#### 1.19 SHOP PRIMING AND PAINTING

- A. All iron and carbon steel surfaces of shop fabricated equipment and all ferrous and nonferrous surfaces specified to be shop primed or painted shall be painted in the shop with one or more coats of primer.
- B. All surfaces to be primed in the shop shall have all rust, mill scale, grease, oils, mud, dirt, welding flux, slag, weld spatter, and other foreign material removed after fabrication and prior to application of primer. Welds shall be scraped, chipped, and brushed as necessary to remove all embedded slag or weld spatter. Sharp edges of cut or sheared edges shall be dulled by at least one pass of a power grinder to improve paint adherence. Surface preparation prior to shop priming shall conform to that specified in the detailed equipment specifications. Where surface preparation prior to shop priming is not otherwise specified, iron and carbon steel surfaces shall be given a commercial blast cleaning in accordance with Steel Structures Painting Council Specification SP-6, galvanized or aluminum surfaces shall be given a solvent cleaning, copper surfaces shall be cleaned with a mild solution of phosphoric acid and buffed or polished to a bright finish, and stainless steel shall be given a solvent cleaning followed by sanding or light blast cleaning to provide a roughened surface. Cleaned surfaces shall be primed immediately after cleaning. Sandblasting shall not be permitted on electrical or mechanical equipment after assembly. Sandblasting shall achieve an anchor pattern or blast profile of between 30 and 40 percent of the dry film thickness of the first applied coat of primer.
- C. Primers shall be applied with suitable brushes, rollers, or spray equipment at a rate of application not to exceed the manufacturer's recommended rate for the surface being painted. Primer shall not be applied in areas where there is an excessive amount of dust present in the air. Primer shall be mixed, stored, and applied in strict adherence to the manufacturer's recommendations. Primed surfaces shall be smooth and free of brush marks, streaks, laps, runs, or skipped or missed areas. Special care shall be taken to ensure that all cracks, corners, and crevices are filled with primer. Shop primed materials shall not be handled or assembled until the shop coating is dry and hard.

- D. Primers, number of coats, and minimum dry film thicknesses shall conform to the shop painting systems specified in the detailed equipment specifications. Where shop primers are not otherwise specified, iron and carbon steel surfaces shall be coated with one (1) coat of alkyd system ferrous metal primer to a minimum dry film thickness of 2.0 mils, and galvanized, stainless steel, copper, and aluminum surfaces shall be coated with one (1) coat of galvanized metal wash primer to a minimum dry film thickness of 0.5 mils. Alkyd system ferrous metal primer shall be Glidden "Glid-Guard Tank and Structural Primer No. 585," TNEMEC "37-77 Chem-Prime," Indurall "G-1221 Primer," or equal. Galvanized metal wash primer shall be Glidden "Glid-Guard Metal Conditioning Primer No. 5290," TNEMEC "32-1210 TNEME-Grip," Indurall "H4-1109 Wash Coat Primer," or equal.
- E. Unless otherwise specified, miscellaneous iron castings shall be given a commercial blast cleaning and coated in the shop with one (1) coat of bituminous paint applied to a minimum dry film thickness of 10.0 mils. Bituminous paint shall be Glidden "Glid-Guard Top Service Thick Black," TNEMEC "46-449 Heavy Duty Black," Indurall "J-1135 Coal Tar Coating," or equal.
- F. Anodizing of aluminum shall be conducted in accordance with Aluminum Association Designation (A41), published by the Aluminum Association, Inc., New York, New York. Unless otherwise shown or specified, the process shall provide a clear anodized finish having a minimum thickness of 0.4 mils. Anodizing shall be conducted after the aluminum item is fabricated.
- G. Machined, polished, and nonferrous surfaces which are not to be painted shall be coated with a rust preventive compound, Dearborn Chemical "No-Ox-Id 2W," Houghton "Rust Veto 344," Rust-Oleum "R-9," or equal.
- H. All surfaces which will be inaccessible after assembly or installation shall be protected by two or more coats of shop applied paint suitable for the life of the equipment.
- I. All nonmachined and nonbearing ferrous surfaces of electric motors, compressors, lubricating oil systems, pumps, blowers, speed reducers, and increasers, motor control centers, transformers, valves, valve operators, controls, and other self-contained, purchased equipment shall be shop cleaned and shop finished with the manufacturer's high-grade, oil-resistant alkyd enamel or epoxy coating system. Nonmachined ferrous surfaces on the interior of gear reducer or increaser cases shall be shop finished with a rust inhibiting alkyd enamel specially designed for gear case or transmission service applied to a minimum dry film thickness of 1.5 mils. Where equipment is specified to be field painted as well, shop primer and finishes shall be compatible with the specified field applied finish.

## 1.20 FIELD PRIMING

All iron and carbon steel surfaces not specified to be galvanized or shop primed and all ferrous or nonferrous surfaces specified to be field primed and painted shall be coated in the field with one or more coats of primer in accordance with the requirements of the Section 09910 "Painting" of these Specifications.

## 1.21 FIELD PAINTING

Except for interior surfaces of vessels and enclosed equipment not specified to be field painted, all ferrous and nonferrous surfaces of equipment which have received one or more coats of shop or field applied primer shall be field painted after installation in accordance with the requirements of the Section 09910 "Painting" of these Specifications.

## 1.22 GALVANIZING

- A. All galvanizing shall be done by the hot-dip process after fabrication in conformity with requirements of ASTM A 123, A 153, A 384, and A 385. Articles to be galvanized shall be pickled before galvanizing.
- B. Where galvanized bolts are specified or required by the Drawings, cadmium or zinc plated bolts will be acceptable provided cadmium plating conforms to ASTM A 165, Type NS, and zinc plating conforms to ASTM A 164, Type GS.
- C. Areas of galvanizing damaged by welding or burning or otherwise damaged shall be thoroughly stripped and cleared and recoated with zinc to the required thickness by the hot dip process.
- D. Galvanized articles shall be free from uncoated spots, blisters, flux, black spots, dross, projections, and other defects not consistent with acceptable galvanizing practice.
- E. Zinc and cadmium plating shall be subject to visual examination to determine uniformity of coating. The Engineer may require that the coating uniformity be tested in accordance with ASTM A 239.

## 1.23 PROTECTION AND STORAGE

- A. All equipment shall be boxed, crated, or otherwise completely enclosed and protected during shipment, handling, and storage. All equipment shall be protected from exposure to the elements and shall be kept thoroughly dry at all times. Compressors, blowers, pumps, motors, valves, control panels, instrumentation, electrical equipment, and other equipment having antifriction or sleeve bearings shall be stored in weathertight warehouses which are maintained at a temperature of at least 60°F. Other equipment may be stored outside under cover. All equipment shall be stored above ground level and adequately supported on wood blocking or other approved support material. Printed storage instructions of the manufacturers shall be strictly adhered to.
- B. Painted, anodized, or otherwise coated surfaces shall be protected against impact, abrasion, discoloration, and other damage. All coated surfaces which are damaged prior to acceptance of equipment shall be cleaned and coated or painted to the satisfaction of the Engineer with the same or equivalent coating used in the original application.
- C. Electrical equipment, motors, controls, and insulation shall be protected against moisture or water damage. All space heaters provided in the equipment shall be kept connected and



operating at all times until equipment is placed in service. Electrical equipment stored without space heaters shall be provided with desiccants to protect against moisture damage. Desiccant shall be silica gel in porous bags at not less than one ounce per cubic foot of volume. Desiccant shall be replaced periodically.

- D. Electrical equipment and instrumentation shall be stored in a location that is free from excessive or injurious amounts of vibration.
- E. Rotating equipment such as pumps, motors, fans, and compressors shall be rotated periodically. In the absence of specific exercising instructions by the equipment manufacturer, each item of rotating equipment shall be rotated a minimum of 10 revolutions at intervals not to exceed 20 days. When shafts are too difficult to rotate by hand, nonmetallic grips shall be used to turn the shafts.
- F. Vehicles such as trucks, forklifts, tractors, lawn mowers, and other engine-powered equipment shall be started up and operated at intervals not to exceed 15 days. Equipment shall be run until engine temperatures and pressures are in normal operating ranges. All lifting, lowering, tilting, loading, and unloading accessories shall be operated at least once during the exercise period. Equipment shall be moved under power from the parked position and run a sufficient distance so as to ensure proper lubrication of drive train and suspension components. All operators employed to exercise the vehicles shall be qualified and thoroughly familiar with the proper operation of the equipment. Forklifts, tractors, lawn mowers, and other small engine-powered equipment shall be stored indoors in garages or other suitable structures. Trucks stored outdoors shall be washed using approved materials at intervals not to exceed 15 days. All exercising and storage of vehicular equipment shall be conducted in a manner acceptable to the Engineer.
- G. Interiors of gear and bearing cases housing oil-lubricated gears and bearings shall be filled with a rust inhibiting oil prior to storage or, if extended storage is anticipated, coated periodically with a rust inhibiting oil mist at intervals of time acceptable to the Engineer. Interiors of large pumps and compressors shall be protected using vapor phase inhibitor paper or porous bags of rust inhibiting, vapor emitting crystals. Exposed shafts shall be coated with rust preventative compound then wrapped with oil-impregnated paper and polyethylene film and sealed with waterproof tape.
- H. Individually packaged, unpainted steel parts shall be protected by a wrapping of vapor phase inhibiting or oil-impregnated paper and polyethylene film.
- I. Parts and equipment not requiring periodic inspection or maintenance shall be stored unopened in their original packaging until used.
- J. Parts, instruments, controls, and small items of equipment shall be stored above ground or floor level on suitable shelves or racks in a heated, watertight warehouse.
- K. Flanged openings on equipment shall be covered with suitable solid wooden or metal blanks securely bolted to the flange using a minimum of four bolts and a suitable rubber gasket. Ends of threaded pipe and fittings shall be sealed watertight with metal or plastic caps. Threaded

openings shall be sealed watertight with metal or plastic plugs. Other openings shall be sealed with two layers of 6-mil polyethylene securely taped in place with waterproof tape.

- L. A maintenance log on each item of mechanical and electrical equipment requiring periodic attention in storage shall be maintained by the Contractor. Oil and grease changes, exercising, desiccant replacement, nitrogen purge checks, heater checks, insulation checks, and other periodic maintenance shall be entered in the log. The maintenance log shall be made available to the Engineer on request.
- M. A resistance test shall be performed on all motor windings and heater elements following storage and prior to installation as a check for insulation deterioration or moisture damage during storage. Insulation tests shall be performed in accordance with the requirements of the Section 16101 "General Electrical Provisions" of these Specifications.
- N. Immediately prior to installation, equipment shall be cleaned of any protective coatings used during storage and any rust, dirt, grit, or other foreign material shall be removed.
- O. After installation and prior to start-up, all grease-lubricated joints, shaft couplings, and bearings shall be flushed out and regreased. All oil reservoirs and sumps shall be completely drained and flushed and refilled with the proper lubricant. Screens and filters shall be checked for contamination and replaced if necessary. The equipment shall then be tagged, signed, and dated, indicating that the equipment has been properly lubricated for start-up.
- P. After storage, rubber parts such as valve seats, diaphragms, expansion joints, gaskets, hoses, and shaft couplings shall be checked for hardening or cracking. Deteriorated parts shall be replaced prior to start-up by the Contractor at his own expense.

#### 1.24 LIMIT SWITCHES AND SENSORS

- A. Unless otherwise specified, limit switches on equipment shall be of the heavy-duty, precision type with NEMA 4 steel enclosure and standard pre-travel lever or plunger operator as required. Limit switches shall have SPDT or DPDT contacts rated not less than 5 amps inductive, 10 amps resistance at 120 volts AC. Limit switches in hazardous locations shall be enclosed in a cast aluminum, explosion-proof enclosure.
- B. Unless otherwise specified, pressure switches shall be of the snap-acting type with internal adjustment and shock-resistant, cast, waterproof enclosure. Contacts shall be SPDT or DPDT rated minimum 15 amps at 125 volts AC. Switch operation shall be by means of a Teflon diaphragm or a Type 316 stainless steel bellows, depending on pressure range. All wetted parts shall be of brass or stainless steel. Switch shall have a repeatability of "1 percent of range or better. Switch shall be UL listed.
- C. Unless otherwise specified, temperature switches shall be of the non-indicating, snap-acting type with internal adjustment, oil-filled stainless steel sensing bulb, and shock resistant, cast watertight enclosure. Contacts shall be SPDT or DPDT rated minimum 15 amps at 125 volts AC. Switch shall be furnished with a separable stainless steel well. Switch shall be UL listed.

## 1.25 EQUIPMENT SPEEDS

- A. Unless otherwise permitted in the detailed equipment specifications or specified on the Drawings, maximum rotative speeds on mechanical and electrical equipment shall be as follows:
  - 1. All centrifugal, axial, and vortex pumps - 1,800 rpm
  - 2. Progressing cavity pumps in wastewater, scum, sludge, or abrasive slurry - 300 rpm
  - 3. Centrifugal, axial, and vortex pumps in wastewater, scum, sludge, or abrasive slurry - 1,200 rpm
  - 4. Propeller fans (direct drive) - 1,200 rpm
  - 5. Propeller fans (V-belt drive) - 700 rpm
  - 6. Centrifugal fans and vent sets - 900 rpm
  - 7. Rotary lobe compressors - 2,500 fpm pitch line velocity
  - 8. Centrifugal compressors - 3,600 rpm.

## 1.26 NOISE CRITERIA

- A. Unless otherwise specified, noise levels for all operating equipment shall not exceed 90 dB at 5 feet from the equipment when measured on the A scale of a calibrated sound level meter at slow response.
- B. Noise criteria shall be met without the use of special external barriers or enclosures.

## 1.27 INSTALLATION CHECK

- A. An experienced, competent, and authorized service representative of the manufacturer of each item of equipment or other person acceptable to the Engineer shall visit the site of the work and inspect, check, adjust if necessary, and approve the equipment installation. In each case, the equipment manufacturer's representative or other person authorized by the Engineer to perform the installation check shall be present when the equipment is placed in operation and shall revisit the jobsite as often as necessary until all trouble is corrected and the equipment installation and operation are satisfactory in the opinion of the Engineer.
- B. Each equipment manufacturer's representative or other person authorized by the Engineer to perform the installation check shall furnish to the Owner, through the Engineer, a written report certifying that the equipment (1) has been properly installed and lubricated; (2) is in accurate alignment; (3) is free from any undue stress imposed by connecting piping or anchor bolts; and (4) has been operated under full load conditions and that it operated satisfactorily. The work described under these Contract Documents will not be accepted as complete until satisfactory installation certifications have been submitted in accordance with the requirements of this section.
- C. The Contractor shall properly coordinate the visits by the manufacturer's representatives, particularly where the operation of an item of equipment is dependent on the operation of other equipment. Prior to calling the manufacturer's representative, the Contractor shall ensure that all necessary related equipment, structures, piping, and electrical work is complete. The

Contractor shall pay for any revisits to the site by the manufacturer's representative made necessary due to the Contractor's failure to properly coordinate the visits.

- D. The Contractor shall secure the services of the manufacturer's representative at the site of the work for as long as is necessary to check the installation and place the equipment in satisfactory operation.
- E. Electrical connections to equipment shall be made only upon approval of the manufacturer's representative.
- F. All costs for this work shall be included in the contract price(s) and no separate payment will be made.

#### 1.28 FIELD TESTING

- A. After installation and checkout, all equipment shall be field tested in the presence of the Engineer and in a manner satisfactory to him. During the field tests, the equipment shall be subjected to various full load and partial load conditions and emergency operating and shutdown conditions. The ability of the equipment to operate in the prescribed manner without overheating, jamming, excessive noise or vibration, or evidence of excessive wear shall be demonstrated to the satisfaction of the Engineer.
- B. All equipment shall be tested before it is covered or insulated. All accessory equipment which may be damaged by conditions during the test shall be isolated or otherwise protected.
- C. All testing instruments and gauges necessary for conducting the tests shall be furnished by the Contractor. Installed instruments and gauges shall be used whenever possible if calibrated and approved for the purpose. Calibrate all installed instruments and gauges and attach a cloth tag showing date of calibration. Portable test equipment used in field testing shall be calibrated in the presence of the Engineer or suitable written evidence attesting to the accuracy of the equipment shall be submitted.
- D. A record shall be made of each field test showing operating temperatures and pressures, motor current and voltage, speed, flow rate, and other pertinent data. Information recorded for fans, blowers, compressors, and pumps shall include static pressures entering and leaving the equipment, fluid temperature entering and leaving the equipment, ambient temperature, barometric pressure and relative humidity, rpm, and discharge flow rate. Four (4) copies of all recorded test data and information shall be submitted to the Engineer for approval.
- E. All equipment handling or operating in water, wastewater, sludge, or corrosive or toxic materials shall be field tested using clean water at normal operating temperatures. Water used shall be potable water unless other sources are approved in writing by the Engineer.
- F. Unless otherwise specified in the detailed equipment specifications, the Contractor shall furnish all labor, materials, water, air, oil, power, fuel, chemicals, test equipment, and other items required to conduct the field tests, including any retests.

- G. Should the results of the tests indicate that the equipment has failed to perform in accordance with the requirements of the applicable detailed equipment specification, in the opinion of the Engineer, the Contractor shall make at his own expense such modifications or adjustments as required for satisfactory operation, including replacement of any or all components, if necessary. Following the modifications or adjustments, the Contractor shall repeat the field tests as specified herein. This procedure shall be repeated until the results of the field tests indicate that the equipment has satisfied the requirements of the applicable specification section.
- H. The cost of all field testing shall be included in the contract price(s) and no separate payment will be made.

#### 1.29 IDENTIFICATION OF PIPING AND EQUIPMENT

- A. All piping and equipment shall be identified as follows:
  - B. All equipment and piping specified to be painted shall be color coded. The colors shall be as specified in the section entitled "Painting" of these Specifications. Insulated piping shall be identified using plastic bands, arrows, and letters, colored and sized in accordance with said "Painting" section.
  - C. All major items of equipment shall have an identification nameplate. The Contractor shall submit a suitable list of all items of major equipment to the Engineer, who will furnish the Contractor with an identification numbering system. The nameplates shall be of Type 304 stainless steel, No. 6 finish, and not less than No. 16 gauge with indented stamped lettering. Nameplates shall be attached to equipment bases in easily visible and accessible locations. Nameplates shall be fastened in a permanent manner, arranged not to damage the equipment, with not less than four stainless steel fasteners. All nameplates shall contain as a minimum the following information, where applicable:
    1. Name of equipment (from equipment specifications)
    2. Manufacturer
    3. Model designation
    4. Rated horsepower
    5. Service factor
    6. Electrical and insulation specifications
    7. Speed (rpm)
    8. Capacity and head (discharge pressure)
    9. Net weightLettering shall be upper case, block style in size and spacing to suit the nameplate. A sample nameplate including fastenings shall be submitted to the Engineer for approval prior to manufacture of any of the nameplates. The identification nameplates shall not be painted.
  - D. Piping shall be identified with a designation and directional flow arrows as described in the section entitled "Painting" of these Specifications.
  - E. All valves shall be identified with a round brass disc, approximately 1-1/2 inches in diameter and not less than No. 14 gauge, coated with a clear lacquer. Discs shall be fastened to valves in a permanent manner; however, attachment by chain to handwheels or other operators shall

not be acceptable. Discs shall be stamped using indented numerals and/or letters with a valve number corresponding to its identification number in the valve schedule to be included in the Operation and Maintenance Manual.

- F. All push-button stations, switches, motor controllers, transmitters, and other control equipment shall have identification nameplates of the engraved, laminated plastic type affixed to or adjacent to the switch, push button station, etc.
- G. All manufacturer's nameplates, identification nameplates, and ASME code plates located on areas of equipment to be insulated shall be removed and reattached on uninsulated areas in a manner acceptable to the Engineer and in his presence.

### 1.30 WARNING SIGNS

- A. Permanent warning signs shall be furnished and installed on all mechanical and electrical equipment where a hazard exists as specified herein. Signs shall be made in accordance with OSHA requirements and shall be suitable for exterior use. Mounting details shall be in accordance with manufacturer's recommendations; location as approved by the Engineer. Fasteners shall be stainless steel.
- B. Warning signs shall be approximately 10 inches high by 14 inches wide, colored yellow and black, on minimum 0.080-inch aluminum stock.
- C. Warning signs shall be placed at all appropriate locations as described herein or on the Drawings. See Drawing for additional requirements for warning signs.
- D. At a minimum, warning signs shall be furnished as follows:
  - 1. The following sign shall be affixed to all equipment which may be started automatically from a remote location:

CAUTION  
THIS EQUIPMENT MAY START  
AUTOMATICALLY  
WITHOUT WARNING

- 2. The following sign shall be affixed to all electrical equipment or instrument panels, as applicable:

CAUTION – SHOCK HAZARD  
THIS EQUIPMENT IS POWERED BY MULTIPLE SOURCES  
CONTACTS MAY BE ENERGIZED AFTER LOCAL  
POWER IS DISCONNECTED

- 3. The following sign shall be provided at all areas where oxygen or flammable materials are stored or used (colored red, white, and black):

DANGER  
NO SMOKING, MATCHES,  
OR OPEN FLAMES

4. The following sign shall be affixed to all entrance hatches or access manways on covered tanks and vessels:

CAUTION  
OXYGEN DEFICIENT OR TOXIC CONDITIONS MAY EXIST  
FOLLOW PRESCRIBED PROCEDURES BEFORE ENTRY

END OF SECTION

## SECTION 01630

### PRODUCT SELECTION AND SUBSTITUTION PROCEDURES

#### PART 1 GENERAL

1.1 SECTION INCLUDES: Product selection and substitution procedures.

#### 1.2 PRODUCT SELECTION

- A. Provide products that comply with the Contract Documents, that are undamaged, and unless otherwise indicated, new at the time of installation.
- B. To the fullest extent possible, provide products of the same kind from a single source.
- C. Compatibility among product options is required. Where more than one choice is available as options during product selection, select an option which is compatible with other products and materials already selected.
- D. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and the intended use and effect.
- E. Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.
- F. Where Contract Documents are at variance with specific manufacturer's details and installation procedures, contact Engineer for resolution prior to start of work.

#### 1.3 SUBSTITUTIONS

- A. The intent of these Specifications is to provide the Owner with a quality facility without discouraging competitive bidding. Substitutions may be submitted and will be evaluated as specified herein.
- B. The Contractor's bid includes products named in the Specifications. The Contractor may propose a substitute product under and in accordance with the Standard General Conditions (Section 00700) Subsection 6.05, as modified by the Supplementary Conditions (Section 00800.) Unless the Engineer expressly approves the substitute, the Contractor must provide a product named in the Specifications.

#### PART 2 PRODUCTS - NOT USED

#### PART 3 EXECUTION - NOT USED

END OF SECTION



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## SECTION 01640

### STORAGE AND PROTECTION

#### PART 1 GENERAL

##### 1.1 GENERAL

- A. Equipment shall be received, inspected, unloaded, handled, stored, maintained, and protected by the Contractor in a suitable location on or off site, if necessary, until such time as installation is required.
- B. Storage and protection of Contractor-furnished equipment shall be in strict conformance with the requirements of the Section 01610 "General Equipment Stipulations" of these Specifications.

##### 1.2 STORAGE

- A. The Contractor shall be responsible for providing satisfactory storage facilities which are acceptable to the Engineer. In the event that satisfactory facilities cannot be provided on-site, satisfactory warehouse facilities, acceptable to the Engineer, will be provided by the Contractor for such time until the equipment, materials, and products can be accommodated at the site.
- B. Equipment, materials, and products which are stored in a satisfactory warehouse acceptable to the Engineer will be eligible for progress payments as though they had been delivered to the job site.
- C. The Contractor shall be responsible for the maintenance and protection of all equipment, materials, and products placed in storage and shall bear all costs of storage, preparation for transportation, transportation, rehandling, and preparation for installation.
- D. Equipment and products stored outdoors shall be supported above the ground on suitable wooden blocks or braces arranged to prevent excessive deflection or bending between supports. Items such as pipe, structural steel, and sheet construction products shall be stored with one end elevated to facilitate drainage.
- E. Unless otherwise permitted in writing by the Engineer, building products and materials such as cement, grout, plaster, gypsum-board, particleboard, resilient flooring, acoustical tile, paneling, finish lumber, insulation, wiring, etc., shall be stored indoors in a dry location. Building products such as rough lumber, plywood, concrete block, and structural tile may be stored outdoors under a properly secured waterproof covering.
- F. Tarps and other coverings shall be supported above the stored equipment or materials on wooden strips to provide ventilation under the cover and minimize condensation. Tarps and covers shall be arranged to prevent ponding of water.

### 1.3 EXTENDED STORAGE

In the event that certain items of major equipment such as air compressors, pumps, and mechanical aerators have to be stored for an extended period of time, Contractor shall provide satisfactory long-term storage facilities that are acceptable to the Engineer. The Contractor shall provide all special packaging, protective coverings, protective coatings, power, nitrogen purge, desiccants, and lubricants, exercising necessary or recommended directive by the manufacturer to properly maintain and protect the equipment during the period of extended storage.

END OF SECTION

SECTION 01710  
CLEANUP

PART 1 GENERAL

1.1 DESCRIPTION

This section covers general cleaning which the Contractor shall be required to perform both during construction and before final acceptance of the project unless otherwise shown on the Drawings or specified elsewhere in these Specifications.

1.2 HAZARD CONTROL

- A. The Contractor shall store volatile wastes in covered metal containers and remove from premises daily.
- B. The Contractor shall prevent accumulation of wastes which create hazardous conditions.
- C. Burning or burying rubbish and waste materials on the site shall not be allowed.
- D. Disposal of volatile wastes into sanitary or storm sewers shall not be allowed.

1.3 DISPOSAL OF SURPLUS MATERIALS

- A. Unless otherwise shown on the Drawings, specified or directed, the Contractor shall dispose of all surplus materials and equipment from demolition, legally off the site, and shall provide his own suitable, off-site spoil area, or on a site designated by the Owner.
- B. The Owner shall have the opportunity to inspect any equipment or materials removed prior to disposal by the Contractor. If said equipment and/or materials are determined to be salvageable by the Owner, the Contractor shall transport said equipment and material to a building or area designated by the Owner.

1.4 FINAL CLEANING

The Contractor shall:

- A. Schedule cleaning operations so that dust and other contaminants resulting from the cleaning process will not fall on wet, newly painted surfaces.
- B. Employ experienced workmen or professional cleaners for final cleaning.
- C. Broom clean paved surfaces; rake clean other surfaces of grounds.
- D. Upon completion of the work, Contractor shall remove from the site all plant, material, tools and equipment belonging to him, and leave the site with an appearance acceptable to the Engineer.

- E. Restoration of Landscape Damage - Any landscape feature scarred or damaged by the Contractor's equipment or operations shall be restored as nearly as possible to its original condition at the Contractor's expense. The Engineer will decide what method of restoration shall be used.
- F. Post-Construction Cleanup or Obliteration - Contractor shall obliterate all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess or waste materials, or any other vestiges of construction.

END OF SECTION

## SECTION 01720

### PROJECT RECORD DOCUMENTS

#### PART 1 GENERAL

##### 1.1 MAINTENANCE OF DOCUMENTS

- A. The Contractor shall maintain accurate record documents related to the furnishing and installation of equipment, materials, and products at the site of the project during the course of the work.
- B. The Contractor shall maintain at the project site one record copy of each of the following:
  - 1. Contract Drawings
  - 2. Specifications
  - 3. Addenda
  - 4. Reviewed Shop Drawings
  - 5. Change Orders
  - 6. Other Modifications to Contract Documents
  - 7. Field Test Records

Project record documents shall be stored in suitable files and racks in a location satisfactory to the Engineer and shall be available at all times to the Engineer. The documents shall be maintained in a clean, dry, legible condition and shall not be used for construction purposes.

##### 1.2 RECORDING

The Contractor shall label each document "Project Record" in one-inch high letters. Record documents shall be kept current and work shall not be permanently concealed until the required information has been recorded.

- A. Contract Drawings: Contractor shall legibly mark to record the actual construction on the project record set of prints of the Contract Drawings, including reviewed shop drawings, the following:
  - 1. Horizontal and vertical location of underground utilities and appurtenances referenced to mean sea level or permanent surface improvements.
  - 2. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
  - 3. Field changes of dimension and detail, including elevations of foundations.
  - 4. Changes made by change order or field order.
  - 5. Details not on original Drawings.

After completion of the work, the Contractor shall prepare a reproducible set of project record drawings by drafting: (1) the notations made on the record set of prints onto a set of reverse reading, translucent, matte finish, mylar reproducible Drawings furnished by the Owner; and (2) notations on the record set of shop drawings onto translucent, matte finish, mylar reproducible (ozalid process) copies of the reviewed shop drawings furnished by the Contractor.

- B. Specifications and Addenda: The Contractor shall legibly mark up each section to record:
1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed
  2. Changes made by change order or field order
  3. Other matters not originally specified.

### 1.3 SUBMITTAL

At the completion of the work and prior to final acceptance by the Owner, the Contractor shall deliver the Project Record Documents to the Engineer. The Project Record Documents shall be acceptable to the Engineer before final payment is made.

With the submittal of the Project Record Documents the Contractor shall submit a list of each document submitted and a certification that each document as submitted is complete and accurate.

END OF SECTION

## SECTION 01730

### GUARANTEES AND WARRANTIES

#### PART 1 GENERAL

##### 1.1 GENERAL WARRANTY

- A. The Contractor shall warrant all equipment, materials, products, and workmanship provided by the Contractor under these Contract Documents for a period of 12 months after the date of final acceptance of the Work by the Owner.
- B. If, during the warranty period
  - 1. any equipment, materials, or products furnished and/or installed by the Contractor are found to be defective in service by reason of the Contractor's faulty process, structural and/or mechanical design or specifications, or
  - 2. any equipment, materials, or products furnished and/or installed by the Contractor are found to be defective by reason of defects in material or workmanship, the Contractor shall, as soon as possible, after receipt of written notice from the Owner, repair or cause to be repaired such defective equipment, materials or products, or replace such defective equipment, materials or products.
- C. In the event of multiple equipment failures of major consequence prior to the expiration of the one-year warranty described above, the affected equipment shall be disassembled, inspected, and modified or replaced as necessary to prevent further occurrences. All related components that may have been damaged or rendered non-serviceable as a consequence of the equipment failure shall be replaced. A new 12-month warranty against defective or deficient design, workmanship, and materials shall commence on the day that the item of equipment is reassembled and placed back into operation. As used herein, multiple equipment failures shall be interpreted to mean two or more successive failures of the same kind in the same item of equipment or failures of the same kind in two or more items of equipment. Major equipment failures may include, but are not limited to, cracked or broken housings, piping, or vessels, excessive deflections, bent or broken shafts or structural members, broken or chipped gear teeth, overheating, premature bearing failure, excessive wear, or excessive leakage around seals. Equipment failures which are directly and clearly traceable to operator abuse, such as operating the equipment in conflict with published operating procedures, or improper maintenance, such as substitution of unauthorized replacement parts, use of incorrect lubricants or chemicals, flagrant over- or under-lubrication, and the use of maintenance procedures not conforming with published maintenance instructions, shall be exempted from the scope of the 1-year warranty. Should multiple equipment failures occur in a given item or type of equipment, all equipment of the same size and type shall be disassembled, inspected, modified or replaced, as necessary, and rewarranted for 1 year.
- D. Neither the foregoing paragraphs nor any provision in the Contract Documents, nor any special guarantee time limit implies any limitation of the Contractor's liability with the law of the place of construction.



## 1.2 START-UP OF OPERABLE COMPONENTS

- A. Because of the need to maintain operation during construction, it will be necessary to accept and start-up operable components of the project at various times prior to the completion and final acceptance of the entire project.
- B. A component of the project, as used herein, shall mean a complete process subsystem and shall include all associated structures, equipment, piping, and controls, etc.
- C. When a component of the project has been completed, checked out, field- tested, and made ready for operation, the Contractor shall notify the Engineer in writing that the component is substantially complete and request an inspection for substantial completion. The Engineer will schedule the inspection within 10 days of the Contractor's request. If the Engineer concurs in the Contractor's statement, the Engineer will notify the Contractor in writing that the component is accepted as substantially complete. At the same time, the Engineer will submit to the Contractor a list of items that must be completed or corrected before final acceptance can be given.
- D. If a component of the project is needed in order to maintain operation during construction and if it has been accepted as substantially complete, the Contractor shall start up the component when directed by the Engineer. Once the component has achieved stable and satisfactory operation (minimum 95 percent availability over a 7-day period), the Contractor shall request beneficial occupancy by the Owner. The Owner, if he concurs in the Contractor's statement, that stable and satisfactory operation has been achieved, will notify the Contractor in writing within 10 days that he is assuming beneficial occupancy of the component.
- E. On the date that the Owner assumes beneficial occupancy, the following shall occur:
  - 1. The one-year warranties for the component specified in Part 1.01 of this section will begin; and
  - 2. The Owner will assume responsibility for operating and maintaining the component.

END OF SECTION

**DIVISION 2: SITE WORK**

## SECTION 02100

### CLEARING AND GRUBBING

#### PART 1 GENERAL

##### 1.1 DESCRIPTION

- A. Clearing and grubbing includes, but is not limited to removal from the project lands of trees, stumps, roots, brush, structures, abandoned utilities, trash, debris, and all other materials found on or near the surface of the ground in the construction area and understood by generally accepted engineering practice not to be suitable for construction of the type contemplated. Precautionary measures to prevent damage to existing features to remain is part of the work.
- B. Existing structures left on the job site are to be removed by Contractor from the project lands upon the direction of the owner. Structures may be demolished and properly disposed of or moved.

##### 1.2 QUALITY ASSURANCE

- A. The Contractor shall comply with applicable codes, ordinances, rules, regulations, and laws of local, municipal, state or federal authorities having jurisdiction over the project. All required permits shall be obtained for construction operations by the Contractor.
- B. Open burning will have to be permitted with the city/county air pollution bureau and/or the local fire department. The Contractor is hereby made responsible for said permit and for any fees to be paid in obtaining said permit.

##### 1.3 JOB CONDITIONS

- A. Prior to bidding the work, the Contractor shall examine and inspect the construction site as to the nature and location of the work, and the general and local conditions at the construction site; including, without limitation, the character of surface or sub-surface conditions and obstacles to be encountered on and around the construction site; and shall make such investigation as he may deem necessary for the planning and proper execution of the work.
- B. The area to be cleared and grubbed is shown schematically on the drawings. It includes all areas designated for construction.
- C. Disposal of unburnable debris shall be made off-site, or as directed by the Engineer. Burying of vegetative debris on site will not be permitted.

## PART 2 PRODUCTS

### 2.1 EQUIPMENT

- A. The Contractor shall furnish equipment with operators of the type normally used in clearing and grubbing operations including, but not limited to tractors, trucks, loaders, root rakes, and burning equipment.
- B. The Contractor shall furnish discing equipment capable of plowing the soil to a depth of 6 inches twice in a single pass.

## PART 3 EXECUTION

### 3.1 CLEARING AND GRUBBING

- A. Materials to be cleared, grubbed and removed from the construction area and lands of the Owner include, but are not limited to the following: all trees, stumps, roots, brush, trash, organic matter, paving, miscellaneous structures, houses, debris and abandoned utilities.
- B. Surface rocks and boulders shall be grubbed from the soil, stockpiled, and/or placed in embankments in accordance with the Specifications.
- C. The entire construction area shall be grubbed by heavy tractors with root rakes. Raking shall generally proceed along the contour rather than up and down slopes so as to inhibit soil erosion.
- D. Grubbing shall consist of completely removing roots, stumps, trash, and other debris from all graded areas so that topsoil is free of roots and debris. Topsoil is to be left sufficiently clean so that further picking and raking will not be required.
- E. Burying of residual materials will not be allowed.
- F. Stumps and roots shall be grubbed and removed to a depth not less than 2 feet below grade. All holes or cavities which extend below the subgrade elevation of the proposed work shall be filled with crushed rock or other suitable material, compacted to the same density as the surrounding material.
- G. The Contractor shall exercise special precautions for the protection and preservation of trees, cultivated shrubs, sod, fences, etc. situated within the limits of the construction area but not directly within excavation and/or fill limits. The Contractor shall be held liable for any damage his operations have inflicted on such property.

### 3.2 DISCING

- A. After grubbing is complete, discing of the entire area is required. Discing shall be done in two directions at approximate right angles. The second discing shall generally be done along the contour.
- B. The construction area is to be left free-draining with a finished agricultural appearance.

END OF SECTION

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## SECTION 02115

### EROSION AND SEDIMENT CONTROL

#### PART 1 GENERAL

##### 1.1 RELATED DOCUMENTS

Drawings and General Provisions of the Contract, including General and Supplemental Conditions and other Division 1 Specification Sections, apply to this Section.

##### 1.2 SUMMARY

- A. This section includes all Contractor provided labor, systems, materials, etc. to provide complete site erosion control in conformance with these specifications as well as all applicable local, State and Federal regulations in sufficient detail to control the spread of wind and water borne materials that would be detrimental to adjoining public or private property, the site, and improvements on the project. These measures shall include the Contractor's construction and maintenance of temporary erosion control features as shown in the plans or as may be directed by the Owner's Representative.
- B. The "Operator" as referred to herein or in any regulatory documents or permits shall mean the Contractor.

##### 1.3 REFERENCE STANDARDS

- A. Section 104 of the FDOT Standard Specifications, 2004 edition.
- B. Rule 62-621.300 (4), F.A.C. and the "Generic Permit for Stormwater Discharge from Large and Small Construction Activities", FDEP Document 62-621.300(4) (a).

##### 1.4 SUBMITTALS

- A. Prior to the pre-construction meeting, the Contractor shall obtain, prepare and submit the FDEP Form 62-621.300 (4) (b), "Notice of Intent (NOI) to use a Generic Permit for Stormwater Discharge from Large and Small Construction Activities". The type of project or activity that qualifies for use of the Generic Permit, the conditions of the permit, and additional requirements to request coverage are specified in the Generic Permit document (FDEP Documents 62-621.300 (4) (a)). The appropriate Generic Permit fee, as specified in Rule 62-4.050 (4) (d), F.A.C., shall be submitted with the NOI in order to obtain permit coverage. Submit a copy of the NOI and confirmation of receipt of the NOI and fee from the NPDES Stormwater Notices Center prior to the pre-construction meeting.
- B. The Contractor shall submit to the Engineer a detailed "Erosion and Sediment Control Plan" and "Stormwater Pollution Prevention Plan" (SWPPP) for review. Included shall be plan (s) of the site locating all siltation skirts, hay bales, turbidity curtains, and other features required to control erosion, sediment, water and air pollution, on and off the site. The plan shall be sequenced to show changes during the life of the project; shall be coordinated with on-site

stockpiling of fill and top soil; and shall be directly coordinated with the construction sequence for stormwater improvements. The Contractor shall not start any earthwork or site clearing until the plant is “Owner’s” Representative.

- C. The plan shall include catalog cuts of all materials provided in support of the plan. The “Erosion and Sediment Control Plan” and SWPPP shall be submitted at or before the preconstruction conferences.
- D. At the conclusion of construction and prior to final acceptance by the Engineer, the Contractor shall complete and submit the FDEP Form 62-621.300(6), “Notice of Termination (NOT) of Generic Permit Coverage” in accordance with the instructions contained therein. Submit a copy of the NOT and confirmation of receipt of the NOT from the NPDES Stormwater Notices Center prior to final acceptance by the Engineer.

## 1.5 PERMANENT EROSION CONTROL

This section is not intended to address the permanent Contractor installed erosion control features such as groundcover, pea gravel, grading, and the installation of drainage structures. It applies only to the temporary efforts required of the Contractor during the full construction process. The Contractor shall incorporate the permanent erosion control features into the project as soon as possible.

## PART 2 – PRODUCTS

### 2.1 SILTATION FENCES

The siltation fences shall be geotechnical woven or non-woven fabric conforming to the applicable application requirements of Section 985 of the Florida Department of Transportation “Standard Specifications for Road and Bridge Construction”. The type and size of posts and wire mesh reinforcement will be at the option of the Contractor and applicable to the installation conditions.

### 2.2 EROSION CONTROL MATTING

Erosion control matting shall be woven, biodegradable geotechnical fabric. It shall be used to temporarily stabilize channels or steep slopes until vegetation is established. This type selected shall be comparable to the grass cover applied for the particular installation. The material shall be stapled in place at 18 inches on center with a minimum matting lap of 4 inches.

### 2.3 HAY OR STAW BALES

Hay and straw bales shall be individual bales each entrenched 4 inches into the soil. The bales shall be clean, fresh hay or straw. Bales shall be replaced when they become clogged with silt, deteriorate, or after a period of 3 weeks, whichever occurs first. The particular application may require that bales be staked into the ground with rebar.



## 2.4 TURBIDITY CURTAINS

Turbidity curtains shall be floating of sufficient depth to reach within 1.0 feet of the bottom of the receiving water. They shall be similar to the types manufactured by the American Boom and Barrier Corp. They shall yellow or international orange in color. The material shall be 45 mils thick (18 to 22 oz/sq. yd) and fully sewn or vulcanized seamed to provide flexible and buoyant units. The top floatation shall maintain a 3-inch freeboard above the water surface.

## PART 3 – EXECUTION

### 3.1 GENERAL

- A. The Contractor shall install and maintain all necessary temporary erosion control features for the full period of construction. These features shall be coordinated with all applicable construction features to assure the continuous and effective control of erosion and degradation of surface water quality on and adjoining the site. In the event of unforeseen conditions, the Owner may require the use of control features utilizing methods other than those indicated or proposed by the Contractor.
- B. The Contractor shall perform all clearing and grubbing operations such that the area of unprotected erodible earth exposed at any one time is not larger than the minimum area necessary for efficient construction operations, and the duration of exposed, uncompleted construction shall be kept as short as practicable.

### 3.2 EARTHWORK PROCESS

- A. The Owner may limit the area of unprotected erodible earth exposed by clearing, grubbing, excavation, backfilling, or stockpiling operations and may direct the Contractor to provide immediate temporary erosion or pollution control measures to prevent erosion, degradation or receiving water, or windblown transfer of materials. As a result, the Contractor's efforts shall be in keeping with his capability to grade, gravel, and install the permanent erosion control measures.
- B. If unforeseen erosion problems arise as a result of the design, weather conditions, or the Contractor's operations, the Contractor shall be required to implement acceptable temporary erosion control features during construction when the Owner so directs.

### 3.3 TEMPORARY EROSION CONTROL

- A. General: Temporary erosion and water pollution control features shall consist of, but not be limited to, temporary groundcover, temporary gravel, temporary mulching, sandbagging, slope drains, sediment basins, sediment checks, berms, baled hay or straw, floating turbidity curtain, and silt staked fence. The Contractor may find design details for some of these items in the Water Quality Section of the applicable edition of the Florida Department of Transportation "Department's Roadway and Traffic Design Standards." The Owner's Representative may direct use of temporary erosion control features or methods other than those indicated herein.

Any such advice given the Contractor by the Owner shall not relieve the Contractor from fully preventing erosion.

- B. Temporary Groundcover or Gravel: The Contractor may provide temporary gravel or groundcover with mulching to provide temporary erosion control in areas where applicable or where site conditions warrant. The Contractor shall obtain the approval of the Owner for the use of all forms of temporary groundcover. Where temporary groundcover is provided, the final condition of the plant material may warrant its removal and replanting at no additional cost the Owner.
- C. Temporary Mulch: This work shall consist of furnishing and applying a 2-inch to 4-inch thick blanket of straw or hay mulch into the top 2 inches of the soil in order to temporarily control erosion. Only undecayed straw or hay, which can readily be cut into the soil, shall be used. Other measures for temporary erosion control such as hydro mulching, chemical adhesive soil stabilizers, etc. may be substituted for mulching with straw or hay if approved by the Owner's Representative. When permanent grassing operations begin, temporary mulch materials shall be plowed under in conjunction with preparation of the ground.
- D. Sandbagging: This work shall consist of furnishing and placing sandbags in configurations so as to control erosion and siltation.
- E. Slope Drains: This work shall consist of constructing slope drains, utilizing pipe, fiber mats, rubble, cement concrete, asphaltic concrete plastic sheeting, or other acceptable materials, or as may be approved as suitable to adequately perform the intended function.
- F. Temporary Sediment Basins: Temporary sediment basins, if necessary, shall be constructed to adequately perform the intended function. Sediment basins shall be cleaned out as necessary to maintain flow function or as directed.

END OF SECTION

SECTION 02200  
EARTHWORK

PART 1 GENERAL

1.1 DESCRIPTION

- A. Earthwork includes, but is not limited to excavating, filling, compacting, and grading to obtain the required finished ground surface properly prepared to receive pavements, buildings, and drainage structures.
- B. The work includes ditching in ground areas of high water table to allow the soil to drain prior to making excavations.
- C. The work includes adjustment of moisture content of soils placed in fills if soil tests show it necessary to allow compaction requirements to be met.
- D. The work includes the reduction of all ripable rock materials encountered in the course of the work to the sizes and gradations suitable for placement in rockfills and riprap. Included are all surface boulders as well as ripable rock materials encountered in excavations.
- E. The work includes the removal of surface soils into stockpiles and placement of same into designated locations including roadway embankments, drainage areas, curb and island backfills, and roadway shoulders.
- F. The work includes construction staking to control earthwork construction.
- G. The work includes undercutting unsuitable soil materials and replacing with compacted, approved on-site soils.

1.2 QUALITY ASSURANCE

- A. Soil testing will be done on a continuous basis while grading operations are underway.
- B. The Contractor shall be solely responsible for all lines, levels and measurements for this work. He shall provide his own instruments and survey crew to maintain this control throughout the duration of his work.
- C. Testing and inspecting services will be the responsibility of the Contractor by an independent testing company provided approved by the District. When scheduling testing, the District requires a minimum of 24 hours' notice with a preferred 48-hour notice prior to testing. Copies of all test reports shall be submitted to the Engineer. The testing company will have an authorized representative on the site to check compaction and determine suitability of fill materials during the grading operations.

### 1.3 JOB CONDITIONS

- A. Erosion control measures shall take place prior to the start of any grading work.
- B. Prior to bidding the work, the Contractor shall examine and inspect the construction site as to the nature and location of the work, and the general and local conditions at the construction site; including, without limitation, the character of surface or subsurface conditions and obstacles to be encountered on and around the construction site; and shall make such investigation as he may deem necessary for the planning and proper execution of the work.
- C. The Engineer shall be immediately notified if suspected unsuitable foundation or subgrade material is encountered during Contractor's grading activities.
- D. A soil report and boring logs have been prepared for this site. This information was gathered solely for the use of the Designers and is not to be used as a basis for calculations in preparing a bid. The use and interpretation of the geotechnical information for any purpose will be entirely the responsibility of the using party. Neither the Owner nor the Engineer gives any guarantee, either expressed or implied; that the borings or geotechnical report represent a true cross section of all the material to be encountered in performing the excavation and earthwork on this project.

### PART 2 PRODUCTS

#### 2.1 SOIL MATERIALS

- A. Fill materials for embankments shall be clear soil containing no rocks larger than 6 inches and rockfill, if rock is produced by excavating on site.
- B. The top 4 inches of all permanently vegetated areas shall be soil material of good quality.
- C. Backfill material for structures and retaining walls shall be material obtained off site. Backfill material is subject to approval by the Engineer.
- D. Special backfill, where specified, shall be crushed stone or natural or manufactured sand subject to approval of the Engineer.
- E. Drainage fill shall be Size #57 crushed stone meeting ASTM C33.

## PART 3 EXECUTION

### 3.1 GRADING

#### A. Stripping

1. Cut areas and embankment areas shall have all organic topsoil, brush, and other deleterious materials and obvious loose surface materials removed. Undercutting of alluvial soils which exist in drainage features is required.

#### B. General Grading Requirements

1. For general grading, the finished contours and spot elevations shown on the drawings indicate the finished surface to be obtained by construction. Grades not otherwise shown shall be straight lines between points where elevations are shown. Provide rounding at the top and bottom of slopes and at intersections of planes. Where profiles and typical sections are provided, the profiles and typical sections shall have precedence over the grading plans.
2. Where pavement or building construction is indicated, Contractor shall make due allowance for the thickness of pavement or building structures. Contractor shall note that areas to receive topsoil or riprap are to be left at such grades and elevations that when topsoil or riprap are placed, the finished surface will conform to that shown on Drawing.
3. Grading operations shall be so conducted that materials shall not be removed or loosened beyond the required limits.

#### C. The finished surfaces shall be left in smooth and uniform planes such as are normally obtainable from the use of hand tools. If the Contractor is able to obtain the required degree of evenness by means of mechanical equipment, he will not be required to use hand labor methods. Slopes and ditches shall be neatly trimmed and finished to slopes shown on the Plans unless otherwise approved by the Engineer in writing.

1. Mass Graded Areas: Finish areas within not more than 0.50 foot above or below the required subgrade elevation provided drainage patterns remain unchanged.
2. Pavements, Buildings, and Drainage Features: Shape surface of areas to line, grade, and cross-section with finished surface not more than 0.10 foot above or below the required subgrade elevation.

### 3.2 PROOFROLLING

All areas that will support fill, pavement, foundations, or slabs shall be proofrolled with a fully loaded tandem dump truck (or equivalent) to detect soft areas. Proofrolling shall be observed by an experienced Geotechnical Engineer from the testing laboratory hired by the Owner. Proofrolling shall be accomplished by making two complete passes in each of two perpendicular directions. Any areas which exhibit "pumping" (indicating soft spots) shall be undercut to a level specified by the Geotechnical Engineer and replaced with approved fill material compacted in accordance with requirements for fill as specified herein.

### 3.3 EXCAVATION

- A. Excavation consists of removing all materials encountered in establishing required grade elevations, utility installations, and other job requirements. Excavation includes transporting and placing material in embankments, backfills, or temporary stockpiles as required to meet the requirements of the Plans and Specifications.
- B. No classification of excavated materials will be made. Excavation and trenching work shall include the removal and subsequent handling of all materials excavated or otherwise removed in the performance of contract work, regardless of type, character, composition, or condition thereof.
- C. General Excavation Requirements
  1. Excavation operations shall be managed to ensure proper placement of soil materials not suitable for placement near the surface of embankments. If necessary, the Contractor shall temporarily stockpile excavated earth so that it will be available to top off embankments.
  2. Stability of Excavation: Slope sides of excavations to comply with local codes and ordinances having jurisdiction and with good construction engineering practice. Shore and brace where sloping is not possible either because of space restrictions or stability of material encountered. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.
  3. Dewatering Excavations: Prevent surface water and subsurface or groundwater from flowing into structure excavations.
    - a. Do not allow water to accumulate in structure excavations. Remove water to prevent softening of foundations. Provide and maintain sumps, pumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
    - b. Convey water removed from excavations to storm drain system or outfall ditches. Provide and maintain temporary drainage ditches and other diversions outside excavation limits for each structure. Do not use trench excavations as temporary drainage ditches.
  4. Material Storage: Stockpile as directed by Engineer satisfactory excavated materials until required for backfill or fill. Place, grade and shape stockpiles for proper drainage and protect from erosion. Locate and retain soil materials away from edge of excavations.
  5. Excavation for Structures: Conform to the elevations and dimensions shown within a tolerance of plus or minus 0.10 foot and extending a sufficient distance from footings and foundations to permit placement and removal of concrete formwork, installation of services, and other construction required, and for inspection.
  6. Areas of excavation as indicated on the Plans shall be excavated to the limits shown with no classification of excavated material. Excavated rippable rock shall be incorporated in construction of the fills with the method of construction subject to the Engineer's approval. Broken rock resulting from drilling, blasting or other methods may also be utilized in fill construction, subject to Engineer's approval of maximum size of rock, method of construction and areas of placement.

- D. Limits of Rock Excavation: Limits are minimum dimensions to which any part of the rock encountered will be allowed to remain.
  - 1. Beneath pavements, excavate to 6 inches beneath base course.
  - 2. Beneath structures, excavate 12 inches beneath bottom of structure.
  - 3. Beneath pipe in trenches, excavated 8 inches beneath the bottom of pipe.
- E. Unauthorized Excavation
  - 1. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the Engineer.
  - 2. Unauthorized excavation shall be backfilled and compacted with fill material or special backfill as directed by the Engineer.
- F. If the Contractor encounters unsuitable material below subgrade elevation while accomplishing excavation, it shall be removed and replaced as directed by the Engineer. In no case shall objectionable material be allowed in or under the subgrade. Final determination of the classification of any material as unsuitable shall be made by the Geotechnical Engineer and such decision shall be final.

### 3.4 EMBANKMENT AND BACKFILL CONSTRUCTION

- A. Place acceptable and appropriate material in compacted layers to the required subgrade elevations for each area classification to be filled. All materials entering the fill shall be free of organic material, such as leaves, grass, roots and other objectionable material.
- B. Embankments
  - 1. Prior to commencement of grading operations, the Contractor shall proofroll all areas that will receive fill with a fully loaded tandem dump truck. Where quicksand, soft clay, swampy or other material unsuitable for subgrade or foundation purposes is encountered, it shall be removed and disposed of to the level of suitable material. Areas so excavated shall be backfilled with approved material compacted by tamping to the density of the surrounding suitable material and to the lines and grades shown on the Drawings. Unsuitable material will be disposed of within the spoil areas, as designated by the Engineer. Final determination of the classification of any material as unsuitable shall be made by the Geotechnical Engineer and such decision shall be final. In areas that will receive deep fills, the material may remain and be bridged as directed by the Engineer. No additional payment will be made for bridging by using track vehicles only prior to placement and compaction of fill with pans and sheepsfoot rollers.
  - 2. Rockfill and soils classified other than common excavation may be used only in embankment areas and then in thin layers at the very bottom of fill and more than 8 feet below finished grade and more than 6 feet beneath paving subbase course.
  - 3. Fills shall be formed of satisfactory materials placed in successive horizontal layers of not more than 6 inches in loose depth for the full width of each strip. A strip shall be defined as being no less than 8 feet wide. Rockfill may be placed in layers up to 12 inches thick in the lower portion of fills unless otherwise approved by the Engineer.
- C. Structure and pipe backfill shall be placed in thin layers and compacted to the required minimum densities for fills. Backfill placement shall be balanced to prevent wedging action on structures and pipes.

- D. Backfill in storm sewer, sanitary sewer, water line, or any other trenches which lie *under pavement* shall be #57 crushed stone compacted to the required minimum densities for fills and installed according to City specifications.
- E. Rockfill shall be placed in embankments from the bottom upward. In no case shall earthfill material be buried underneath rockfill or soils classified other than common excavation. Earthfill material shall be stockpiled as required to allow the total quantity of rockfill to be placed in permissible locations as defined above.
- F. In areas where rock or unsuitable soils are excavated to allow construction of pavements, structural fill shall be placed and compacted as shown below.
- G. **Compaction**
  - 1. General: Control soil compaction during construction providing densities as specified when tested by ASTM 698.
  - 2. Standard proctor tests (ASTM 698) shall be done in accordance with generally accepted practice by the testing laboratory hired by the Owner for the purpose of comparing field densities to standard proctor test maximum densities unless noted otherwise or instructed otherwise by the Engineer, field density testing. Field density testing should be performed on each lift prior to placement of additional lifts. Test locations should be evenly distributed throughout the fill area and should be performed at the frequencies shown on the following table:

Area	Method of Placement / Completion	Initial Test Frequency	Retest Frequency
General Site	Large self-propelled equipment	1 test per lift per 5,000 square feet	1 test per failed test
Isolated Areas	Hand-guided equipment	1 test per lift	1 test per failed test
Trench backfill and behind retaining walls	Hand-guided equipment	1 test per 50 linear feet per 6 inches of fill	1 test per failed test

Test frequencies may be increased during the early stages of earthwork construction. Compaction requirements apply to all excavation/backfill operations conducted on site.

- 3. Soils shall be placed at a moisture content which is within minus 1 or plus 3 percentage points of the optimum moisture content and to the following percentages of the maximum dry density as determined by ASTM 698:
  - a. All Embankments and Backfills: Compact to 95 percent except as hereinafter specified.
  - b. Top 12 Inches of Subgrade Under Pavements: Compact to 100 percent.
  - c. Top 12 Inches of Subgrade Under Slabs: Compact to 100 percent.
  - d. Rockfill shall be compacted by passes of heavy equipment or by drum type vibrating compactors as required to achieve a relative density of 75 percent or as directed by the Engineer.
- H. Curbed shoulders and islands shall be backfilled with stockpiled surface soils if available after other uses are completed. Contractor shall place surface soils from stockpiles in a 4-inch minimum thickness layer on all areas designated for planting, grassing, etc.
- I. Any areas inaccessible to a roller shall be consolidated and compacted by mechanical tampers. The equipment shall be operated in such a manner that weathered rock, cemented



gravel, clay or other chunky soil material will be broken up into small particles and become incorporated with the other material in the layer.

- J. In the construction of filled areas, starting layers shall be placed in the deepest portion of the fill, and as placement progresses, additional layers shall be constructed in horizontal planes. Unless otherwise directed by the Engineer, original slope shall be continuously vertically benched to provide horizontal fill planes. The size of the benches shall be formed so that the base of the bench is horizontal, and the back of the bench is vertical.
- K. As many benches as are necessary to bring the site to final grade shall be constructed. Filling operations shall begin on the lowest bench, with the fill being placed in horizontal 6 inch loose lifts unless otherwise authorized by the Engineer. The filling shall progress in this manner until the entire first bench has been filled, before any fill is placed on the succeeding benches. Proper drainage shall be maintained at all times during benching and filling of the benches, to ensure that all water is drained away from the fill area.
- L. The Contractor shall be responsible for the stability of all fills made under the contract, and shall replace any portion which, in the opinion of the Engineer or his designated representative, has become displaced due to carelessness or negligence on the part of the Contractor. Fill damage by inclement weather shall be repaired at the Contractor's expense.

### 3.5 MAINTENANCE

- A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion and keep free of trash or debris. Repair and re-establish grades in settled, eroded and rutted areas to specified tolerances.
- B. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, remove to sound material, reshape, and compact the required density prior to any further construction.

### 3.6 EROSION CONTROL

The Contractor shall utilize hay bales and other erosion control devices not only as detailed on the Drawings or required by the Specifications, but at such times and places as are necessary to satisfy local and governmental laws and regulations, to keep silt from washing onto existing paved surfaces, protect culverts or other drainage structures, or as directed by the Engineer.

END OF SECTION

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## SECTION 02215

### SUBGRADE CONSTRUCTION AND PREPARATION

#### PART 1 GENERAL

##### 1.1 SCOPE

The work described in this section includes furnishing all labor and equipment necessary for the construction and preparation of part or all of the roadbed to receive the immediate construction of a base or pavement thereon.

#### PART 2 EXECUTION

##### 2.1 EQUIPMENT

All equipment necessary and required for the construction of the subgrade must be on the project, proven to be in first-class working order, and approved by the Engineer before construction will be permitted to begin. This shall consist of at least one motor grader with scarifier and one pneumatic tired roller meeting the requirements of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

##### 2.2 SUBGRADE PREPARATION

- A. Road and drainage excavation and embankment construction shall be performed in accordance with the provisions set out in the Section 02220 "Earthwork" of these Specifications.
- B. The subgrade shall be prepared to the lines and grades staked by the Engineer and to correspond to the cross section of the bottom of the pavement as indicated on the Drawings or as directed.
- C. Where excavation is necessary to prepare the subgrade, the material removed shall be carefully stored or placed for use in completing the roadbed. Unsuitable material shall be wasted as directed by the Engineer.
- D. All rock shall be removed to a depth of not less than 6 inches below the surface of the subgrade and all holes or depressions, caused by the removal of rock, or otherwise, shall be backfilled with satisfactory material and thoroughly compacted.
- E. Where the roadbed is below grade the Contractor shall prepare the subgrade by hauling and spreading satisfactory material excavated in channeling, or otherwise. The material shall be spread in layers not to exceed 6 inches in thickness and thoroughly compacted by rolling, and using water if directed. Each layer shall have been completed before the succeeding layer is started.
- F. Where it is intended or required to use steel forms in the construction of the base of pavement, the subgrade shall be constructed at least 12 inches wider, on each side, than the neat width of

the base of pavement. For bases or pavements using wooden forms, the subgrade shall be constructed at least 6 inches wider, on each side, than the width of the base or pavement, as indicated on the Drawings or as directed.

- G. Where sub-bases are to be constructed on the subgrade, the limits of the subgrade preparation shall extend across the entire section upon which any subbase course is to be applied, including the shoulders.
- H. When the subgrade is being prepared for the construction of a Portland cement concrete base or Portland cement concrete pavement it shall be formed to the approximate grade and cross section. The preparation of the subgrade shall be performed in conformity with the requirements set out in the section covering the particular type of construction.

### 2.3 SUBGRADE COMPACTION

- A. After the subgrade has been approximately prepared and shaped, it shall be loosened in its entirety by discing, harrowing or other approved methods to a depth of not less than 6 inches prior to its being compacted to the approved density. The subgrade shall then be thoroughly compacted with the approved 10-ton roller or pneumatic tired roller. The density shall be 100 percent of AASHTO density when tested by the Standard Specifications for Compaction and Density of Soils, AASHTO Serial Designation T 99 (latest revision). The limits of the subgrade compaction shall extend across the entire section upon which any base or subbase course is to be applied, including the shoulders. Prior to reworking and compacting the subgrade, all vegetation within the limits as set out above shall be removed and properly disposed of as directed by the Engineer.
- B. All soft, yielding material, which will not compact readily under the roller, shall be removed as directed. All holes or depressions caused by the removal of material, as described above, shall be backfilled with satisfactory material and the entire surface thoroughly compacted with the roller where possible, or otherwise when directed by the Engineer.
- C. The subgrade shall be checked after the rolling and adjusted so as to conform to the grade and cross section, as indicated or directed. It shall be rerolled if directed.
- D. The final rolling of the subgrade, preparatory to the construction of the Portland cement concrete base or pavement thereon, shall be performed between the forms after they are finally set to line and grade.

### 2.4 SCOPE OF SUBGRADE

The subgrade shall be true to lines, grades, and cross sections; must be free from dust or other loose material; must have a uniform bearing power; and shall be prepared and maintained at least 500 feet in advance of the placing of any materials thereon, except between November 1 and April 1, the distance may be reduced to 200 feet if permitted by Engineer.

## 2.5 DRAINAGE

- A. Grading of the subgrade shall be performed in such a manner that berms of earth or other material which will interfere with the immediate drainage of water from the subgrade to the side ditches will not remain on the roadbed, at any time. All side ditches and drains shall be maintained to provide for proper drainage during the construction.
- B. All ditches and drains shall be completed so as to drain the roadbed effectively before the placing of any construction materials will be permitted.

## 2.6 PROTECTION OF SUBGRADE

- A. In handling materials, equipment, tools, etc., the Contractor shall take all precaution necessary to protect the subgrade from damage. Only hauling necessary for the purpose of construction will be permitted on the subgrade after it has been completed.
- B. If ruts of 2 inches or more in depth are formed in the subgrade, all construction materials, whether stored or in place, within the range of such ruts, shall be removed and the subgrade shall be reshaped and rolled. All ruts or rough places developing in a completed subgrade shall be smoothed and the subgrade rerolled.

## 2.7 SUBGRADE CHECKING

- A. The subgrade must conform to the lines, grades, and cross sections, indicated or directed, before it will be permitted to construct base or pavement thereon, and shall be subject to test just prior to construction.
- B. The subgrade for base or pavement requiring steel side forms will be checked by a special tester, as provided in the section covering this type of construction.
- C. All excess material shall be removed until the subgrade is at true elevation. Low subgrade shall be built up to the proper form and elevation when practical to roll, or if not practical to roll, it shall be filled as an integral part of the base or pavement at the Contractor's expense.

## 2.8 SITE CLEANING

The disposal of excess or unsuitable material shall be performed in accordance with the provisions set out in the Section 01700 "Cleaning" of these Specifications and final cleanup shall be performed in accordance with the provisions set out in the Detailed Specifications of the Contract.

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## SECTION 03240

### CAST-IN-PLACE CONCRETE REINFORCEMENT

#### PART 1 GENERAL

##### 1.1 SCOPE

This specification section describes steel reinforcement to be furnished and installed in cast-in-place concrete. The Contractor shall furnish all steel reinforcement, supports, and materials and all labor equipment, and other items necessary or convenient to the Contractor for the proper installation of the reinforcement. The Contractor shall also supply and install any additional reinforcement required by vendors at no additional cost to the Owner.

##### 1.2 GENERAL

- A. Steel reinforcement shall be designed, detailed, fabricated and placed in conformance with all applicable requirements of the latest editions of ACI 315, ACI 318, and the *CRSI Manual of Standard Practice*.
- B. No concrete shall be placed until all steel reinforcement to be covered has been inspected in place and approved by the Engineer.

##### 1.3 SUBMITTALS

- A. Prior to placing any steel reinforcement, the Contractor shall submit to the Engineer written evidence that the steel reinforcement has been tested and is in conformance with the material and mechanical requirements specified herein. Certified copies of mill tests may be considered evidence of compliance provided such tests are regularly conducted by the reinforcement supplier by experienced, competent personnel using adequate testing equipment. In case of doubt as to the adequacy or accuracy of the mill tests, the Engineer may require the Contractor to furnish, at no additional cost to the Owner, test results from an independent testing laboratory acceptable to the Engineer on mill samples or delivered steel reinforcement. Mill or laboratory test results for verifying compliance with this Specification section shall be provided for each 15 tons of steel reinforcement shipped. Results of laboratory or mill tests submitted to the Engineer shall be of tests conducted not earlier than 90 days prior to delivery.
- B. The cost of all sampling and testing of steel reinforcement necessary to furnish satisfactory evidence of compliance shall be borne by the Contractor and no separate payment will be made.
- C. Prior to fabrication and bending of steel reinforcement, the Contractor shall submit to the Engineer for review and approval complete shop drawings, bending diagrams, and schedules of all steel reinforcement to be incorporated in the work.
- D. The reinforcement shop drawings and bending diagrams shall show all dimensions, details, notes, location, size, length, and each bar mark, together with accessories and other materials belonging to the reinforcement for the concrete. Schedules shall show all information and be

of the same general form as those on the Drawings. Concrete walls shall be detailed in elevation. The reinforcement shop drawings and bending diagrams shall also show all dimensions, details, notes, location, size, length, and each bar mark, together with accessories and other materials belonging to each of the reinforcement types for the concrete. There shall be a lap splice table provided for each reinforcement type used in the design. Schedules shall show all information and be of the same general form as those on the Drawings. Concrete walls shall be detailed in elevation.

## PART 2 PRODUCTS

### 2.1 MATERIALS

- A. Reinforcing Bars: Reinforcing bars shall be deformed billet-steel bars conforming to ASTM A 615. All bars No. 4 and larger shall be Grade 60. All bars No. 3 and smaller shall be Grade 40. All bars shall be shop-fabricated and bent cold. Bars shall be free from defects and kinks and from bends not indicated on the Drawings or approved bending diagrams.
- B. Mesh Reinforcement: Mesh reinforcement shall be electrically welded, cold-drawn, mild-steel, plain wire fabric conforming to ASTM A 185. Wire shall be cold-drawn steel conforming to ASTM A 82. Mesh will be provided in flat sheets only; rolls of mesh reinforcement are not acceptable.
- C. Support Chairs
  - 1. Reinforcement supports shall conform to Product Standard PS7 and *CRSI Manual of Standard Practice*, Class D or E.
  - 2. Reinforcement support chairs shall be stainless steel or shall be plastic-tipped when used in walls and elevated slabs. Support chairs used in slabs on grade shall be stainless steel or shall be hot-dip galvanized after fabrication or plastic-tipped in such a manner as to provide 12 inches; the minimum protection from the subgrade as required in these documents. Nails shall not be used to support reinforcement.
- D. Tie Wire: Tie wire shall conform to Federal Specification QQ-W-461 and shall be of black annealed steel, 16-gauge minimum.

## PART 3 EXECUTION

### 3.1 DELIVERY AND STORAGE

Reinforcement shall be delivered to the job site carefully bundled and tagged for identification. Reinforcement shall be stored at least 12 inches above ground on timber mats or other supports acceptable to the Engineer. Contact between reinforcement and the ground shall not be permitted during storage. Reinforcement shall be supported so as not to bend or deflect excessively under its own weight.



### 3.2 SURFACE PREPARATION

Before placement, all reinforcement shall be thoroughly cleaned of oil, dirt, mill scale, rust scale, and other coatings that would tend to destroy or reduce bond. All coatings on epoxy-coated bars shall be intact or rejected and removed from the job site. Note that all epoxy-coated bars require additional lapped lengths per ACI 318. A thin coating of orange rust resulting from short exposure will not be considered objectionable, but any reinforcement having heavy rust scale or thick rust coating shall be thoroughly cleaned to the satisfaction of the Engineer or shall be rejected and removed from the job site. When there is a considerable delay between placement of reinforcement each of the reinforcement types and placement of concrete, the reinforcement each of the reinforcement types shall be reinspected prior to placement of concrete and recleaned if necessary.

### 3.3 PLACEMENT

- A. Reinforcement shall be accurately positioned and tied at intersections with annealed wire or suitable clips approved by the Engineer. Reinforcement shall be supported by concrete or metal chairs, stays, spacers, hangers, or other supports acceptable to the Engineer.
- B. Reinforcing bars shall be fastened with wire ties at a minimum of three places per bar. Bars shall be tied at every intersection around the periphery of slabs. Wall steel shall be tied at every fourth intersection as a minimum.
- C. Reinforcement supports shall have sufficient strength and stability to maintain the reinforcement in place throughout placement and concreting operations. Supports and ties shall not be exposed at the face of the concrete nor shall they discolor the surface of the finished concrete.
- D. Movement of steel reinforcement in place during concreting operations shall be prevented. Any reinforcement which is displaced shall be accurately repositioned in the proper place before being completely covered.
- E. Dowels for successive work shall be securely fastened in correct position before placing concrete. The sticking of dowels after placing concrete shall not be permitted.
- F. Reinforcement which has been exposed for bonding with future work shall be protected from corrosion by heavy wrappings of burlap saturated with a bituminous material.
- G. No bars partially embedded in concrete shall be field-bent unless approved by the Engineer.

### 3.4 MINIMUM COVER AND CLEARANCE

The minimum concrete cover for the protection of embedded steel reinforcement shall be as follows:

- A. Surfaces cast against crushed rock, sand, or earth:  
All bar sizes 3 inches

- B. Surfaces exposed directly to water, backfill, or weather after form removal:  
All bar sizes 2 inches
- C. Surfaces not exposed directly to water, backfill, or weather after form removal (Bar Size No. 11 and smaller):
1. Elevated slabs 1 inch
  2. Floors, walkways, pavement  $\frac{3}{4}$  inch
  3. Walls
    - Less than 12 inches thick  $\frac{3}{4}$  inch
    - 12 inches or thicker 2 inches
  4. Beams
    - Stirrups  $1\frac{1}{2}$  inches
    - Principal reinforcement 2 inches

The minimum clearance between adjacent parallel bars shall not be less than the nominal diameter of the bars, not less than 1.5 times the maximum coarse aggregate size, and not less than 1 inch in beams,  $1\frac{1}{2}$  inches in columns, and 2 inches in other locations.

### 3.5 TOLERANCES

- A. Allowable tolerances for fabricating steel reinforcement shall be as follows:

Item	Maximum Tolerance
Sheared length of bars	+1/2"-1/2"
Depth of truss bars	+0.0"-1/2"
Outside dimensions of stirrups, ties, and spirals	+1/2"-1/2"
Location of bends	+1"-1"

- B. Allowable tolerances for placing steel reinforcement shall be as follows:

Item	Maximum Tolerance
	Concrete
cover from outside of bar to finished surface	+3/8"-3/8"
Lateral spacing of bars in plane of reinforcement in beams and joists	+1/4"-1/4"
Lateral spacing of bars in plane of reinforcement in slabs and walls	+1/4"-1/4"
Spacing of stirrups, ties, and spirals along longitudinal axis of member	+1/4"-1/4"
Height of bottom bars in slabs, beams and joists	+3/8"-3/8"
Height of top bars in slabs, beams and joists	
Depth 8" and less	+3/8"-3/8"

Depth 9-24"  
Depth 25" and greater

+1/2"-1/2"  
+1"-1"

### 3.6 SPLICES

- A. Splices in reinforcement shall conform to the requirements of ACI 318, Chapter 7, "Details of Reinforcement." Additional lap length is required for all epoxy-coated wire fabric per ACI 318. The ACI 318 requirements will serve as a minimum only; additional splice length may be required as indicated in the design documents. Unless otherwise shown on the Drawings, all bars shall be lapped a minimum of 36 bar diameters where splicing is necessary and splices shall be staggered. Except where indicated on the Drawings, welding or tack welding of reinforcement shall not be permitted. Lapped connections shall be sufficient to transfer the full stress between the bars by bond and shear and to develop the full strength of the bars. In slabs and beams no splices shall be made at points of maximum positive or negative moment, and in no case shall adjacent bars be spliced at the same place.
- B. Although tolerances are allowed in the lateral spacing of parallel bars in the plane of reinforcement layers and in the spacing of stirrups, ties, and spirals along the longitudinal axis of a member, in no case shall the number of bars per layer of reinforcement provided in walls and slabs be less than the lateral dimension of the wall or slab in the plane of the reinforcement layer divided by the specified spacing, nor shall the number of stirrups, ties, or spirals provided along the longitudinal axis of a member in a given segment be less than the length of the segment divided by the specified spacing.
- C. Welded wire fabric reinforcement shall be lapped a minimum of 6 inches at joints and shall be wired securely. Mesh shall extend to within 2 inches of sides and ends of slabs. Lapped ends of welded wire fabric shall be offset to prevent continuous laps. Splices shall not be made midway between supporting beams or directly over beams of continuous structures.

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## SECTION 03310

### CAST-IN-PLACE CONCRETE

#### PART 1 GENERAL

##### 1.1 SCOPE

- A. This specification section covers all materials, equipment, and methods to be used by the Contractor in mixing, placing, testing, finishing, and curing cast-in-place concrete. The Contractor shall furnish all cement, aggregate, water, admixtures, and other materials and all labor, equipment, and supplies necessary or convenient to him for completing the work described in these Contract Documents.
- B. Cast-in-place concrete reinforcement and form work shall be as specified in the Section 03240, "Cast-In-Place Concrete Reinforcement" and Section 03110, "Concrete Formwork" respectively of these Specifications.

##### 1.2 CLASSIFICATION OF CONCRETE

- A. Concrete shall be either Class A or Class B, as indicated on the Drawings or specified in these Specifications. If the class is not otherwise specified, the Contractor shall furnish Class A concrete.
- B. In general, Class A concrete shall be used for reinforced concrete cast-in-place in forms for piers, headwalls, tanks, slabs, floors, walls, columns, footings, foundations, pile caps, manholes, and similar reinforced concrete structures coming under the scope of ACI 318. Class B concrete shall be plain concrete and shall be used for pipe cradles, pipe and conduit encasement, bedding, grade correction, anchors, collars, thrust blocks, massive sections, and other non-reinforced concrete.

##### 1.3 GENERAL REQUIREMENTS

- A. All cast-in-place concrete shall be accurately formed and properly placed and finished as shown on the Drawings and specified herein.
- B. The materials, aggregate grading, cement content, and placement methods specified herein are intended to provide a concrete that satisfies the minimum strength requirements, exhibits sufficient plasticity and cohesiveness to facilitate placement and reduce honeycombing and porosity, and incorporates a minimum water-to-cement ratio to minimize bleeding and shrinkage and to provide maximum watertightness. However, the Contractor may submit to the Engineer for review and approval alternate material requirements and placement techniques for achieving the desired results.
- C. All Class A cast-in-place concrete shall be designed in accordance with the applicable requirements of ACI 318, latest edition.

## 1.4 PRELIMINARY MIX DESIGN

- A. Before starting any concreting operations, the Contractor shall submit to the Engineer for approval a preliminary mix design for each class of concrete and for each size and gradation of aggregate and each consistency within a given class of concrete intended for use in the work. The preliminary mix design submittals shall contain the following information for each:
1. Fine Aggregate (Sampled per ASTM D 75)
    - a. Source and type
    - b. Sieve analysis per ASTM C 136
    - c. Magnesium sulfate soundness per ASTM C 88
    - d. Deleterious substances per ASTM C 117, C 123, and C 142
    - e. Saturated surface dry weight per cubic yard of concrete
    - f. Bulk specific gravity per ASTM 127
    - g. Fineness modulus as defined in ASTM C 125
  2. Coarse Aggregate (Sampled per ASTM D 75)
    - a. Source and type
    - b. Sieve analysis per ASTM C 136
    - c. Abrasion loss per ASTM C 535
    - d. Magnesium sulfate soundness per ASTM C 88
    - e. Deleterious substances per ASTM C 117, C 123, and C 142
    - f. Saturated surface dry weight per cubic yard of concrete
    - g. Bulk specific gravity per ASTM 128
  3. Cement (Sampled per ASTM C 183)
    - a. Manufacturer, type, and ASTM designation
    - b. Sacks per cubic yard of concrete
    - c. Total gallons of water per sack (cf) of cement
    - d. Compressive strength at 7 days per ASTM C 109
    - e. Chemical analysis per ASTM C 114
  4. Slump per ASTM C 143
  5. Air content per ASTM C 231
  6. Unit weight per ASTM C 138
  7. Time to initial set at 70 °F per ASTM C 403
  8. Compressive strength at 7, 14, and 28 days ages per ASTM C 192 and C 39. A total of 9 standard test cylinders shall be prepared and cured in the laboratory for each preliminary mix design, three of which shall be tested each at 7-, 14-, and 28-day ages.
  9. Admixtures
    - a. Manufacturer, type, and ASTM designation
    - b. Dosage and point of introduction into the mix.
- B. A preliminary mix design shall not be considered acceptable if the concrete resulting from that mix design does not produce an average 28-day compressive strength at least 1,200 psi higher than that required, unless a standard deviation for compressive strength testing has been established for the concrete supplier using the methods described in ACI 214. If a standard deviation has been established, the strength used as a basis for selecting concrete proportions shall exceed the required 28-day strength by the amounts given in ACI 318, Section 4.2.2.1, based on the appropriate value of the standard deviation. If a standard deviation is utilized, the Contractor or concrete supplier shall furnish written evidence to the Engineer that the standard deviation has been determined in accordance with the methods described in ACI 214. A written statement from an independent testing laboratory may be considered satisfactory evidence of compliance.

- C. Tests for compressive strength and all sampling and testing of aggregate and cement shall be conducted in accordance with the specified ASTM standards by an independent testing laboratory acceptable to the Engineer. Alternately, when approved by the Engineer, testing of cement and aggregate may be conducted at the point of manufacture by reputable cement and aggregate suppliers who regularly provide such testing services by experienced, competent personnel. Tests for slump, air content, unit weight, and time to initial set may be conducted by the concrete supplier, providing such tests are performed in accordance with the specified ASTM standards by experienced, competent personnel using proper equipment.
- D. The Contractor shall submit with each preliminary mix design four copies of certified laboratory or mill test reports on all aggregate and cement incorporated in the preliminary mix design and four copies of certified laboratory test reports on the compressive strength of the resulting concrete. Test reports on aggregate and cement shall contain written evidence that clearly indicates that all cement and aggregate covered by the test reports conform in all respects to the applicable material requirements of this specification section.
- E. Approval of the preliminary mix designs shall in no way be interpreted to relieve the Contractor of any responsibilities, duties, or obligations for providing concrete conforming to the requirements of this specification section.
- F. If, during the course of concreting operations, the Contractor desires to use an alternate mix design differing from the approved mix design in order to obtain a desired workability, density, strength, or uniformity, he shall submit to the Engineer for approval the information specified herein on the proposed alternate mix design prior to its use.
- G. If, based on the results of laboratory or field tests conducted during concreting operations, concrete prepared according to an approved mix design fails to satisfy the requirements of this specification section, the Engineer shall have the right to require that the Contractor develop and submit in the manner specified an alternate mix design that will provide concrete conforming to the requirements of this section. The need for a change in mix design will be based on the Engineer's statistical analysis and interpretation of laboratory and field tests conducted during concreting operations. Statistical methods and interpretation of test results will be as described in ACI 214 and ACI 318, latest edition.
- H. Any increased material costs resulting from changes in mix designs during construction shall be paid for by the Contractor and no separate payment will be made.
- I. The cost of all materials, labor, equipment and all sampling and testing services required for the preliminary mix designs or for alternate mix designs during construction shall be paid for by the Contractor and no separate or additional payment will be made.

#### 1.5 QUALITY CONTROL DURING CONSTRUCTION

- A. Certification of Material Compliance
  - 1. During concreting operations, the Contractor shall furnish the Engineer written evidence that clearly indicates that the cement and aggregate used in each batch of concrete delivered to or mixed at the job site conforms in all respects to the applicable material requirements of this specification section. Satisfactory certified mill test reports from the cement or aggregate suppliers may be considered as evidence of compliance provided that such testing is performed in accordance with the specified ASTM standards by experienced, competent personnel on a regular basis. In case of doubt as to the adequacy or accuracy of mill tests, the Engineer may require that the Contractor



- furnish, at no additional cost to the Owner, test reports on the cement and aggregate from an independent testing laboratory acceptable to the Engineer.
2. Certified reports or certificates indicating compliance of cement and aggregate shall be submitted to the Engineer before such materials are incorporated into the work. The Contractor shall be responsible for any delays in the progress of the work due to delays in testing and reporting.
  3. Certified reports submitted to the Engineer for laboratory or mill tests on cement and aggregate shall be based on tests conducted not earlier than 90 days prior to incorporation of these materials into the work.
  4. The cost of all sampling and testing of cement and aggregate necessary to furnish satisfactory evidence of compliance shall be borne by the Contractor and no separate payment will be made.

**B. Field Sampling and Testing**

1. During concreting operations, the Engineer will periodically require additional field inspection, sampling, and testing of cement, aggregate, and/or concrete by an independent testing laboratory in order to determine if the requirements of this specification section are being satisfied.
  - a. Field sampling and testing of cement, aggregate, and concrete will be performed according to the following ASTM standards at a frequency determined by the Engineer:
  - b. Aggregate
    - 1 ) S a m p l i n g A S T M D 7 5
    - 2 ) T e s t i n g A n y t e s t s p e c i f i e d i n A S T M C 3 3
  - c. Cement
    - 1 ) S a m p l i n g A S T M C 1 8 3
    - 2 ) T e s t i n g A n y t e s t s p e c i f i e d i n A S T M C 1 5 0
  - d. Concrete
    - 1 ) S a m p l i n g A S T M C 1 7 2
    - 2 ) S l u m p T e s t A S T M C 1 4 3
    - 3 ) A i r C o n t e n t T e s t A S T M C 2 3 1
    - 4 ) M a k i n g a n d C u r i n g T e s t C y l i n d e r s A S T M C 3 1
    - 5 ) C o m p r e s s i o n S t r e n g t h T e s t s A S T M C 3 9
2. Compressive strength testing will consist of making, curing, and testing cylinders of concrete. A total of six test cylinders will be prepared from each sample of concrete to be tested. Two test cylinders will be broken at an age of 7 days, three test cylinders will be broken at an age of 28 days, and the remaining test cylinders will be held in reserve. The minimum number of samples and test cylinders to be taken is as follows:

Concrete Class	Total Size of Pour	Number of Samples	Number of Cylinders
Class A or C	1-16 cy	1	6
Class A or B or C	17-100 cy	2	12
Class A or B or C	101-200 cy	3	18
Class A or B or C	201-300 cy	4	24
Class A or B or C	Over 300 cy	1/100 cy	(6/100 cy + 6)

3. Test cylinders will normally be laboratory-cured. However, the Engineer may

- require tests on field-cured specimens to check the adequacy of curing operations.
4. A slump test and an air content test will be performed on each concrete truck and on each sample of concrete tested for compressive strength. All field, tests, sampling, and the making of test cylinders will be provided by the independent testing firm.
  5. Cement and aggregate will be subject to inspection, sampling, and field testing at the batching plant. Concrete will be subject to inspection, sampling, and field testing at the place of concrete placement.
  6. All field sampling, field testing, making and curing of field test cylinders, and laboratory testing performed during concreting operations for the purpose of determining if the requirements of this specification section are being satisfied shall be conducted by an independent testing laboratory selected by the Owner and paid for directly by the Owner and not as a part of this Contract.
  7. The Contractor shall furnish the testing laboratory representative satisfactory samples of cement, aggregate, and concrete for inspection and testing purposes. The Contractor shall furnish any barrows, shovels, mixing boards, shaded areas for preparing test cylinders, protected holding/curing areas, and similar equipment required by the testing laboratory representative for securing samples, making test cylinders, and conducting field tests.
  8. No materials or concrete that fail to conform to the requirements of this specification section shall be incorporated into the work.

## 1.6 SHOP DRAWINGS AND ENGINEERING DATA

Complete engineering and product data shall be submitted to the Engineer on all admixtures, curing compounds, hardeners, sealers, and waterstops in accordance with the requirements of the Section 01300, "Submittals" of these Specifications.

## 1.7 GUARANTEE

Provide a guarantee against defective or deficient workmanship and materials in accordance with the requirements of the Section 01730, "Guarantees and Warranties" of these Specifications.

## PART 2 PRODUCTS

### 2.1 GENERAL

- A. Concrete shall be composed of Portland cement, fine aggregate, coarse aggregate, admixtures as specified herein, and water, so proportioned and mixed as to produce a plastic, workable mixture meeting the requirements of this specification section.
- B. Materials and concrete not conforming to the requirements specified herein shall not be incorporated in the work.

### 2.2 MATERIALS

#### A. Cement

1. All cement used in cast-in-place concrete shall be Portland cement conforming to the requirements of ASTM C 150, and, unless otherwise approved by the Engineer, shall be Type 1. No cement of dark color shall be used. No re-sacked, lumpy or partially set cement shall be used.
2. Each sack of cement shall contain not less than 94 pounds (net) of cement, and each sack of cement shall be deemed to have a volume of 1 cubic foot; and each 94 pounds, if weighed or measured in bulk, shall be deemed to have a volume of 1 cubic foot.

B. Fine Aggregate

1. Fine aggregate shall be natural siliceous river sand, consisting of hard, clean, sharp, strong, durable and uncoated particles, conforming to the requirements of ASTM C 33. The mortar strength developed in such test shall be 90 percent of that developed by standard Ottawa sand tested under identical conditions.
2. Fine aggregate shall be graded in conformance with the requirements of ASTM C 33, except that it shall have a fineness modulus of 2.40 minimum and 3.00 maximum and the material passing the No. 200 sieve shall not exceed 3.0 percent by weight of the total sample. Coal and lignite shall not exceed 0.5 percent by weight of the total sample for all concrete. The fineness modulus of fine aggregate incorporated in the work shall not vary more than 0.10 plus or minus from the fineness modulus of the fine aggregate in the appropriate preliminary mix design approved by the Engineer.
3. If the locally available sources of fine aggregate will not yield the required grading, the Engineer may approve alternate gradations if such deviations do not adversely affect the work. However, the amount retained on any individual sieve size shall not exceed 35 percent of the sample and the amount passing the No. 50 sieve shall not be less than 15 percent of the sample.

C. Coarse Aggregate

1. Coarse aggregate shall consist of clean, natural, washed gravel or crushed stone suitably processed and conforming to the requirements of ASTM C 33, Class Designation 3S.
2. Coarse aggregate as delivered to the mixing plant shall be graded, or individual sizes shall be so combined as to fall within the grading requirements corresponding to the following grading size numbers, as contained in Table 2 of ASTM C 33:

**Maximum Aggregate Grading**

<b>Sizes, Inches</b>	<b>Size No.</b>
3/4	67
1	57
1-1/2	467
2	357

3. The maximum size of aggregate shall be no larger than one-fifth of the narrowest dimension between sides of forms within which concrete is to be cast nor larger than three-fourths of the minimum clear spacing between reinforcing bars, or between bars and forms. Coarse aggregate shall be limited to <sup>3</sup>/<sub>4</sub>-inch maximum size for pumped concrete.
- D. Water: Water used in mixing concrete shall be fresh, clean, potable water free from injurious amount of oil, acid, alkali, vegetable, sewage and/or organic matter. Water shall be considered as weighing 8.33 pounds per gallon.

E. Admixtures

1. All concrete shall contain an air entraining admixture conforming to ASTM C 260 in order to provide an entrained air content of 5:1 percent by volume. Air entraining admixtures shall be W.R. Grace "Darex AEA," Master Builders "MB-VR," Sika "AER," or equal.
2. All concrete shall contain a chloride-free, water reducing admixture or plasticizer conforming to ASTM C 494, Type A. Water reducing admixtures shall be W. R. Grace "WRDA-64," Sika "Plastocrete," Master Builders "Pozzolith Normal," or equal.

3. Accelerators and retarders may be used under adverse placement conditions when authorized in writing by the Engineer. Accelerators shall be calcium chloride conforming to ASTM D 98, dispensed as a solution. Calcium chloride content shall not exceed 1 percent of the cement content by weight. Retarders shall be chloride-free water reducing and retarding admixtures conforming to ASTM C494, Type D. Retarders shall be W. R. Grace "Daratard-37," Sika "Plastiment," Master Builders "Pozzolith 122R," or equal.
4. The admixture content, batching method, and time of introduction into the mix shall be in strict accordance with the manufacturer's recommendations.

### 2.3 MEMBRANE CURING COMPOUND

- A. Membrane curing compound shall have a 100 percent resin base and shall be of the colorless type with a fugitive dye added conforming to ASTM C 309, Type 1, Class B. The membrane curing compound shall contain sufficient dye to produce a definite, distinguishing color. Curing compound shall be compatible with liquid hardeners and epoxy sealers.
- B. Membrane curing compound shall be Sonneborn "Hydrocide-309," Tamms "Horncure 30D," L&M "Cure DR," W. R. Meadows "CS309," or equal.

### 2.4 POLYETHYLENE FILM

Polyethylene film shall conform to Product Standard PS 17 and, unless otherwise specified or shown on the Drawings, shall have a thickness of 6 mils.

### 2.5 EPOXY BONDING AGENT

Epoxy bonding agents shall be specially formulated to bond fresh concrete to existing concrete. Epoxy bonding agents shall be two-component polysulfide or polyamide epoxies containing 100 percent solids. Epoxy bonding agents shall be insensitive to moisture during cure. When cured at a temperature of 63 °F, neat epoxy bonding agent shall have a one-day compressive strength of not less than 5,000 psi and a 28-day compressive strength of not less than 12,000 psi, when tested in accordance with ASTM D 695, and shall have a 28-day tensile strength of not less than 3,500 psi, when tested in accordance with ASTM D 638.

### 2.6 WATERSTOPS

Unless noted otherwise, waterstops shall be manufactured of PVC and shall be of the ribbed type with center bulb, minimum thickness shall be 3/8 inch. Waterstops shall have a nominal width of 6 inches for concrete members 15 inches or less in thickness and a nominal width of 9 inches for member thickness exceeding 15 inches. Waterstops shall be as manufactured by Greenstreak, W. R. Meadows, Vulcan Products, Tamms, or equal. Waterstops placed in concrete shall be continuous. Lapped joints shall not be permitted.

Where indicated on the drawings, bentonite waterstops will be provided. All bentonite waterstops shall be installed on clean dry surfaces per manufacturers' instructions, and shall not be dampened, hydrated, or allowed to swell prior to concrete placement. Should dampening, hydration, or swelling occur, all bentonite waterstops shall be removed and surfaces cleaned before installing new bentonite waterstops.

Bentonite waterstops shall be bitumen based CETCO "Waterstop-RX," or Synkoflex Products "Hydroflex Waterstop."

On non-horizontal surfaces, bentonite waterstop shall be installed by mechanical means at 18-inch centers in addition to the manufacturer's method of attachment.

## 2.7 CHEMICAL HARDENER

Unless otherwise specified, all interior concrete floors of shops, garages, and vehicle service areas shall be treated with a liquid hardener composed of magnesium and zinc fluorosilicates combined with an anionic surfactant for improved wetting penetration. Liquid hardener shall be colorless, nontoxic, nonflammable, and compatible with and providing good adhesion for subsequent toppings and/or coatings. Liquid hardener shall be suitable for use on new or old concrete floors and shall comply with Corps of Engineer Specification 204. Liquid hardener shall be Sonneborn "Lapidolith," Masterbulders "Mastertop CST," L&M "Fluo Hard," or equal.

2.8 EPOXY FLOOR SEALER

Epoxy floor sealer shall be a two-component, 100 percent solids, epoxy coating that provides a smooth, tough, flexible, wear abrasion, and chemical resistant surface. Sealer shall be USDA approved for use in food processing plants. Epoxy floor sealer shall be applied only where indicated on the Drawings. Unless otherwise specified, sealer shall be colored gray. Epoxy sealer shall be Chem-Masters "Durakote," Masterbuilders "Masterseal GP," Sonneborn "Sonoplex," L&M "Dynaflor," or equal.

2.9 VAPOR BARRIER

Unless otherwise specified, all interior concrete slabs on grade in buildings shall be furnished with an FHA approved vapor barrier under the concrete slab. Vapor barrier shall be constructed of a multi-ply lamination of polyethylene film and glass scrim reinforced paper to form a moisture, scuff, and puncture resistant membrane. Moisture permeance shall not exceed 0.10 perms in accordance with ASTM E96, Procedure A.

2.10 STRENGTH

- A. Concrete ingredients shall be selected, proportioned, and mixed in such a manner as will produce a watertight, durable concrete that will develop the following minimum compressive strengths at an age of 28 days when sampled, cured, and tested in accordance with the procedures specified in ASTM C 31 and C 39:

Average Class of Concrete	Age	Three Consecutive Specimens	Minimum Any One Specimen
A	28 days	4,000 psi	5,000 psi
B	28 days	2,500 psi	2,000 psi
C	28 days	5,000 psi	4,500 psi

As per Florida Building Code 2004, Table 1904.202(1), 5,000-psi concrete (Class C) shall be used for all concrete. All elevated (above EL. +10.0) concrete shall be 4,000 psi (Class A). Special care shall be taken in mixing, handling, placing, finishing, and curing of the 5,000-psi (Class C) concrete due to heat related concerns. **Provisions for "Hot Weather Concreting" found in ACI 305 shall be strictly enforced.**

- B. Should the average compressive strength of three consecutive specimens or the compressive strength of any single specimen fall below the minimum strengths specified above, the Engineer shall have the right to order a change in the mix design for the remaining portion of the work. The Engineer shall also have the right to order additional curing of the affected concrete followed by cores taken in accordance with ASTM C 42 and ACI 318, all at the expense of the Contractor. If the additional curing does not bring the average compressive strength of three cores taken in the affected area to at least the minimum strength specified, the Engineer may require that the Contractor strengthen the structure by means of additional concrete and steel or he may require that the Contractor replace the affected portions. The cost of all such changes in mix designs and any modifications to or replacement of deficient concrete shall be borne by the Contractor at no additional cost to the Owner.

2.11 CONSISTENCY

- A. Concrete shall be of such consistency and composition that it can be worked readily into the

corners and angles of the forms and around the reinforcement without excessive spading and without permitting the materials to segregate or free water to collect on the surface. When dropped from the discharge chute, the concrete mass should flatten out at the center and spread out slowly at the edges.

- B. The proportions shall be adjusted to secure the lowest water-cement ratio which is consistent with good workability, a plastic cohesive mixture, and one which is within the following slump range as determined in accordance with ASTM C143:

<b>Concrete Use</b>	<b>Slump (inches)</b>
Walls	2 <sup>1</sup> / <sub>2</sub> - 4
Floors and Slabs	2 - 3
Beams	2 - 3
Blocks and Footings	2 - 4

- C. Concrete having a slump greater than one inch over the specified maximum shall be rejected.
- D. In pumped concrete the maximum slump of the concrete at the suction of the pump may be increased above the maximum specified slump by the amount of slump loss in the pumping system up to a maximum of one inch. The amount of slump loss shall be the difference between slump tests made at both ends of pumping system, and shall be limited to a total loss of one inch. If tests indicate a loss greater than one inch, the Contractor shall take corrective measures acceptable to the Engineer.
- E. For thin sections and construction with limited clearance between reinforcing steel and when placement conditions preclude the use of vibrators, the Engineer may authorize the use of concrete having a slump of 5 inches.

## PART 3 EXECUTION

### 3.1 STORAGE OF MATERIALS

- A. Cement shall be shipped to the site of the mixer plant in bulk or in paper or cloth bags, at the option of the Contractor. Upon arrival it shall be stored immediately in a thoroughly dry, weathertight and properly ventilated building or enclosure with adequate provisions for the prevention of absorption of moisture. It shall be stored in a manner that will permit easy access for inspection and identification of each shipment. If cement is to be stored at the job site, storage facilities shall be provided by and at the expense of the Contractor and approved

by the Engineer prior to arrival of the first shipment. Cement that has become caked or lumpy shall not be used.

- B. Sand and coarse aggregates shall be stored in separate stockpiles at points selected to provide maximum drainage and to prevent the inclusion of any foreign material during rehandling. Stockpiles of coarse aggregates shall be built in horizontal layers to avoid segregation and breakage. Where concrete volumes require batching of various aggregate sizes, a separate stockpile for each size shall be maintained. The bottom 6 inches of aggregate piles shall not be used.

### 3.2 PROPORTIONING

- A. Concrete materials shall be accurately proportioned and mixed to produce a homogeneous and workable mixture having the consistency and minimum compressive strength specified herein.
- B. Concrete materials shall be proportioned by weight. The types of equipment and methods used for measuring ingredients shall be acceptable to the Engineer.
- C. The amount of water and cement used shall be the minimum amount necessary to produce a concrete mixture of the required strength and consistency, but in no case shall the water-to-cement ratio exceed that specified herein nor shall the cement content be less than that specified herein.
- D. Compressive strength may not necessarily be the most critical factor in proportioning concrete mixes since other factors, such as durability and watertightness, may impose lower water-cement ratios than are required to meet strength requirements. In such cases compressive strength will, of necessity, be in excess of that specified.
- E. Minimum cement contents and maximum water-to-cement ratios shall be as follows:

Factor	Class of Concrete	Maximum Aggregate Size			
		2"	1-1/2"	1"	3/4"
Minimum Cement Factor Sacks/cy	A or C	5.3	5.8	6.2	6.6
	B	5.0	5.5	5.9	6.3
Maximum Water-to-Cement Ratio, lb./lb.	A or C	0.40	0.40	0.40	0.40
	B	0.62	0.62	0.62	0.62
Maximum Water-to-Cement Ratio, Gal/Sack	A or C	5.5	5.5	5.5	5.5
	B	7.0	7.0	7.0	7.0

- F. The water content of the mix shall be based on the total amount of water in the mixture, including any free water in the aggregate or adhering to the surface of the aggregate, but not including water absorbed by the aggregate.
- G. The total volume of aggregate to be used in each cubic yard of concrete shall be determined by recognized standards for designing concrete mixes, utilizing the actual screen analysis of the aggregates.
- H. The proportion of fine and coarse aggregate shall be such that the ratio of the coarse to the fine based on weight shall not be less than 1.0 nor more than 2.0, or shall the amount of coarse



material be such as to produce harshness in placing or honeycombing in the structure.

### 3.3 MIXING CONCRETE

- A. The mixing equipment used by the Contractor shall be capable of combining the aggregates, cement, admixtures, and water within the time specified into a thoroughly mixed and uniform mass.
- B. Concrete shall be mixed by one of the three following methods:
  - 1. By the operation of one or more batch-type mixing plants, each with a rated capacity of  $\frac{1}{2}$  cubic yard or more, installed at the site of the work;
  - 2. By the operation of a proportioning plant installed in the vicinity of the work and the use of transit mixers for mixing concrete and transporting it to the forms; or
  - 3. By the use of ready-mixed concrete from a central mixing and proportioning plant. The method selected by the Contractor shall be subject to the approval of the Engineer.
- C. The mixing and proportioning plants shall be provided with adequate equipment and facilities for accurate measurement and control of the quantities of material and water used in the concrete and for readily changing the proportions to conform to the varying conditions and requirements of the work.
  - 1. Stationary Mixed Concrete
    - a. Stationary mixing shall be done in a batch mixer of approved type which will ensure a uniform distribution of the materials throughout the mass. The equipment at the mixing plant shall be so constructed that all materials including the water entering the drum can be accurately proportioned and be under control. The cement and aggregate shall be proportioned by weight. No volumetric batch shall be allowed. The mixer shall be equipped with an automatic timing device made to lock the discharge level before aggregate and cement enters the drum, and to release such level only after the specified mixing time has elapsed. Stationary mixers shall be in accordance with the "Concrete Mixer Standards" adopted by the Mixer Manufacturer's of the Associated General Contractors of America and shall bear a plate giving the manufacturer's rated capacity of the mixer.
    - b. The entire batch shall be discharged before recharging. The volume of the mixed material per batch shall not exceed the manufacturer's rated capacity of the mixer. Mixing of each batch shall continue for the period indicated herein, during which time the drums shall rotate at a peripheral speed as recommended by manufacturer.
    - c. The mixing time shall be as follows:

<b>Capacity of Mixer</b>	<b>Mixing Time (minutes)</b>
$\frac{1}{2}$ cubic yard	1 $\frac{1}{4}$
$\frac{1}{2}$ to 1 $\frac{1}{2}$ cubic yards	1 $\frac{1}{2}$
Larger than 1 $\frac{1}{2}$ cubic yards	2

The mixing time shall be measured from the time that all cement and aggregates and most of the water are in the mixer. Excessive overmixing, requiring additional water to preserve the required consistency will not be permitted. All of the mixing water shall be introduced before one-fourth of the total mixing time has elapsed.

2. Transit Mixed Concrete

- a. The type, capacity, and manner of operation of the mixing and transporting equipment for transit ready-mixed concrete shall conform to the current *Standards for Operation of Truck Mixers and Agitators* of the National Ready-Mixed Concrete Association, the *Truck Mixer and Agitator Standards* of the Truck Mixer Manufacturers Bureau, and ASTM C94. Transit mix concrete trucks shall be equipped with an automatic device for recording the number of revolutions of the drum during the mixing period. Each mixer and agitator shall have attached thereto in a prominent place, a metal plate or plates, installed by the manufacturer, on which is plainly marked the capacity of the drum in terms of the volume of mixed concrete and the speed of rotation for the agitating and mixing speeds of the mixing drum or blades. Each mixer shall have an identification number painted on the truck in such a location that it can be easily read from the batching platform.
- b. The total volume of materials introduced into the mixer shall not exceed the manufacturer's guaranteed mixing capacity. If the concrete so mixed does not meet the uniformity requirements of this subsection, the amount of materials charged into the mixer shall be reduced.
- c. The drum of the mixer shall be completely emptied of any previously mixed load. The proper proportions of aggregate, cement, and water for each load of concrete shall be placed in the mixer and shall be mixed therein for not less than 70 or more than 100 revolutions of the drum or blades at the speed designated by the manufacturer of the equipment as the mixing speed. Additional revolutions of the drum shall be at the speed designated by the manufacturer of the equipment as the agitating speed; however, immediately prior to discharging the concrete, the drum shall be revolved at the mixing speed for a minimum of three minutes. The revolving of the drum shall be continuous until the concrete is completely emptied from the drum.
- d. When Class A concrete is being placed, all wash water shall be emptied from the mixer before any portion of the succeeding load is placed therein. For Class B concrete the mixer shall be empty or may carry no more than 10 gallons of water in the drum.
- e. Water added at the point of discharge shall only take place with the approval and in the presence of the Engineer. Water so added shall be mixed into the load for a minimum mixing time of three minutes. Water shall not be added to the load during transit.
- f. The total elapsed time between the addition of water to the cement and aggregate or the addition of cement to the water and aggregate and the placement of the concrete in the forms shall not exceed 90 minutes. During hot weather or conditions contributing to quick setting, the total elapsed time permitted may be reduced at the direction of the Engineer to 45 minutes. When the concrete cannot be delivered to the forms within the time period specified, a water-reducing and retarding admixture may be used subject to the approval of the Engineer. Such use of a water-reducing retarder will be permitted only as necessary to supplement (not to replace) other

acceptable hot weather procedures. The retarding admixture used shall not interfere with strength development and other properties of the concrete and its use shall be carefully controlled by the concrete supplier. Before any such admixture is permitted it shall be tested with job site materials under job conditions to determine its compatibility with the other materials and its ability under these conditions to produce the desired properties.

- g. Addition of water at the job site to offset evaporation of mixing water shall be done with the Engineer's approval and in his presence using water in the form of a cement paste having the same water-to-cement ratio as the batch in the transit mixer. Following addition of the cement paste, the mixer drum or blades shall be rotated a minimum of 70 revolutions. Addition of water during transit to offset evaporation losses shall not be permitted.
  - h. Prolonged mixing, even at agitating speed, shall be avoided where feasible by stopping the mixer and then agitating intermittently.
3. Ready-Mixed Concrete
- a. A legible certified weighmaster's certificate shall be prepared for each load of ready-mixed concrete. A legible copy of the certified weighmaster's certificate shall be submitted to the Engineer by the truck operator at the time of delivery. The weighmaster's certificate shall contain the following information:
    - 1) Name of Vendor
    - 2) Name of Contractor\
    - 3) Number of cubic yards in the load
    - 4) Actual weights of cement and of each size of aggregate in the load
    - 5) Amount of water added at the plant
    - 6) Amount of free water in the aggregate
    - 7) Brand and type of cement
    - 8) Brand and amount of admixture
    - 9) Time and date of batching
  - b. When mix proportions have been approved for a project and are identified by a mix number, the Engineer may waive the foregoing and accept a legible certified weighmaster's certificate which shall contain the following information:
    - 1) Name of Vendor
    - 2) Name of Contractor
    - 3) Number of cubic yards in the load
    - 4) Mix designation number
    - 5) Amount of water added at the plant (including free water in aggregate)
    - 6) Time and date of batching
  - c. Space shall be provided on the certificate so that amount of water and cement added on the job may be indicated.

### 3.4 CONVEYING CONCRETE

- A. Concrete shall be conveyed from the mixer to the place of final deposit by methods which will prevent separation or loss of the materials. Equipment for chuting, pumping, and pneumatically conveying concrete shall be of such size and design as to ensure a practically continuous flow of concrete at the delivery end without separation of the materials.

- B. If the concrete is to be transported more than fifty feet in carts or buggies, they shall be equipped with pneumatic tires. Concrete delivered to the carts, buggies or conveyors from spouts, troughs, or mixer trucks shall not have a free fall of more than three feet. Separation or loss of ingredients shall be prevented while transporting the concrete. Delivery carts, buggies, conveyor trucks or barrows shall be kept on temporary runways built over the floor system; runway supports shall not bear upon reinforcing steel or fresh concrete.

### 3.5 PREPARATION

- A. Concrete pre-placement meeting: A meeting shall be held at the job site at least seven days prior to the initial placement of any project concrete. This meeting will require attendance by:
1. General Contractor's Job Superintendent
  2. General Contractor's Project Manager
  3. Rebar Foreman
  4. Concrete Floor Subcontractor
  5. Concrete Supplier Representative
  6. Admixture Representative
  7. Mix Design Representative
  8. Concrete Testing Representative
  9. Concrete Forms Foreman
  10. Client Representative
  11. Architect/Engineer Representative
- B. Specific items to be discussed will be:
1. Interaction Between Various Parties
  2. Establish Schedule and Construction Processes
  3. Assure Availability and Suitability of Materials and Construction Practices
  4. Review Procedures for Inspection, Testing, Placement, Finishing, and Curing.

### 3.6 PLACING CONCRETE

#### A. General

The Contractor shall verify his concrete supplier's ability to supply the quality and quantity of concrete for this project. Failure to supply quality or quantity of concrete shall not be allowed to affect the project's cost or schedule.

1. Prior to placing concrete, the Contractor shall ensure that all reinforcement is securely and properly fastened in position and protected against displacement, that all items to be embedded in the concrete are in place and securely anchored in position, that all forms have been thoroughly coated or wetted, that all form ties at construction joints have been retightened, that concrete surfaces to be covered have had all free water, form coating, loose concrete, and debris removed, and that all conveyances, buggies, and barrows are clean and wetted.
2. Prior to placement of any concrete, a Concrete Placement Card (CPC) will be completed. Failure to complete a CPC prior to concrete placement will, at the Owners or the Architect/Engineer's direction require the removal and reinstallation of the concrete at the Contractor's expense. The following individual will sign the CPC in the order given below acknowledging the following agrees with plans and specifications.

<b>Individual</b>	<b>Responsibility</b>
Construction Layout	Contractor's surveyor responsible for layout of construction including location of centerlines, walls, etc.

Rebar Foreman	Responsible for the proper installation of concrete reinforcing steel including size, placement, and location prior to placing concrete.
Concrete Forms Foreman	Responsible for the proper installation of the forms (embedded items, elevation, alignment, etc.), strength of formwork, and this individual also insures that all formed areas are clean and prepared for proper concrete placement.
Concrete Placing Foreman	Responsible for placing and finishing concrete. Verifies forms and placement conditions (including atmospheric) are acceptable. Verifies all materials and equipment needed for placing and finishing are available in sufficient quantity and equipment is in good working order. Verifies areas to receive concrete have been reviewed for settlement and approved for concrete placement. Notifies the independent testing firm in advance.
Architect/Engineer	Reviews the CPC and verifies it has been completed properly and has received the appropriate signatures.
Resident Project	Once satisfied with the CPC, the RPR initials the CPC signaling Representative (RPR) the work is ready for concrete construction. Copies of the CPC are sent to the General Contractor.

Once satisfied with the CPC, the RPR initials the CPC signaling the work is ready for concrete construction. Copies of the CPC are sent to the General Contractor.

3. The Contractor shall inform the testing firm and Engineer at least 24 hours in advance of the times and places at which he intends to place concrete. The Engineer will make a final inspection of forms, reinforcing steel, screeds, construction joints, openings, anchors, pipe sleeves, conduit, and inserts. No concrete pour shall be started until the condition of the forms and place of pouring has been inspected and approved by the Engineer.
4. Concrete shall not be placed when unusually extreme weather conditions prevent proper placement and consolidation.
5. No water or cement shall be added to the mix without the Engineer's approval or in his absence. No partially hardened concrete shall be deposited.

#### B. Placing Concrete

1. Unless otherwise specified, all concrete shall be placed upon clean, damp surfaces, free from water, and never upon soft mud, dry absorbent earth or rock, or upon fills that have not been subjected to approved tamping to provide ultimate settlement.
2. Groundwater shall be kept below subgrade until the concrete has set. When subgrade is dry earth, it shall be thoroughly dampened with water to ensure that no moisture will be absorbed from fresh concrete.
3. Where concrete is placed against gravel or crushed rock which does not contain at least 25 percent of the material passing a No. 4 sieve or where shown on the Drawings or directed by the Engineer, surfaces against which concrete is cast shall be covered with

polyethylene film to protect the concrete from loss of water. Joints in the film shall be lapped at least 12 inches and taped. The polyethylene film shall be protected against puncture from the underlying crushed rock by a cushion of natural or imported sand meeting the requirements of ASTM D 1073 placed on top of the crushed rock. Where concrete is placed against rock, all loose pieces of rock shall be removed and the exposed surface cleaned with a high pressure hose.

4. Place vapor barrier under designated interior concrete slabs on grade. Sheeting shall extend the full area of the slab and shall be turned up or down to footings as indicated. Lap all seams at least 12 inches and seal per manufacturer's instructions. Install reinforcement with care so as not to puncture vapor barrier. Tape all cuts, tears, punctures, and pipe penetrations before pouring concrete.
5. To prevent segregation of the mix, concrete shall be deposited in its final position in batches without being moved laterally in the forms more than 5 feet. A crane and a bottom dump concrete bucket shall be used wherever possible. Unless authorized by the Engineer, no concrete shall be dropped freely into place from a height of greater than 5 feet. Concrete shall be deposited in walls by means of prefabricated, rectangular tremies, constructed in short sections and spaced laterally not over 5 feet apart. Special care shall be observed to avoid slopping concrete over forms when placing.
6. The limits of each concrete pour shall be predetermined by the Contractor and shall be acceptable to the Engineer. All concrete within such limits shall be placed in one continuous operation.
7. After the concrete has been deposited it shall be distributed over the entire area within the forms in approximately horizontal layers of not more than 18 inches in depth and shall be brought up evenly in all parts of the form. Each layer of concrete shall be plastic when covered with the following layer and the forms shall be filled at a rate of vertical rise of not less than 2 feet per hour or more than 6 feet per hour.
8. Should a layer of concrete reach its initial set before the next lift can be placed, or should more than 60 minutes elapse between placement of successive concrete lifts, the Contractor shall cease placement of concrete until the surface of the previous lift is prepared in accordance with the procedures specified in Part 3.08, Construction Joints, of this specification section.
9. Workmen shall not walk on concrete during placing or finishing with any earth or foreign matter on footwear. Hand spreading shall be done with forks and shovels, not rakes.
10. Concrete shall be placed and compacted in wall or column forms before any reinforcing steel is placed in the structural system to be supported by such walls or columns. The portion of any wall or column placed monolithically with a floor or roof slab shall not exceed 6 feet of vertical height. Concrete in walls or columns shall have set at least two hours before concrete is placed in the structural systems to be supported by such walls or columns. Brackets, haunches and fillets shall be poured monolithic with the floor or roof slab system.

#### C. Compaction

1. During and immediately after placement, concrete shall be thoroughly compacted and worked into all corners and angles and around reinforcement and embedded fixtures in a manner to fill all voids, prevent honeycombing against the forms and avoid segregation of coarse aggregate. This operation shall be performed by the use of spades or forks and internal vibrators.
2. Vibration shall be transmitted directly to the concrete and in no case shall it be transmitted through the forms. Vibrator driving mechanisms shall revolve at not less than 7,000 rpm. The vibration shall be sufficiently intense to cause the concrete to flow and settle readily into place and to visibly affect the concrete over a radius of at least 18 inches. Vibration

shall be supplemented by manual forking or spading adjacent to the forms on exposed faces in order to secure smooth, dense surfaces. Special care shall be taken to ensure consolidation around reinforcement, pipes and other shapes built into the work. Vibrators shall not be used to transport concrete within the forms. Vibrators shall be kept in motion at all times to prevent excessive vibration in one spot. The operation shall be continuous and all concrete shall be in final position before initial set has started.

3. In addition to the vibrators in actual use while concrete is being placed, the Contractor shall have on hand at least one operable vibrator as a spare in case of equipment failure. No concrete shall be placed until all vibrating equipment, including spares, is at the placement site.
4. Concrete shall be thoroughly compacted prior to top finishing. All laitance, debris, and surplus water shall be removed from concrete surfaces at tops of forms by screeding, scraping, or other effective means. Wherever the top of a wall will be exposed to weathering, the forms shall be overfilled and after the concrete has been compacted, the excess shall be screeded off.

D. Placement Sequence: Unless otherwise indicated on the Drawings or directed by the Engineer, the following placement sequence shall be followed to reduce the effect of shrinkage in producing cracking:

1. Bottom Slab: A center section (as outlined by the construction joints shown on the Drawings) shall be placed first. Not less than 72 hours after the center section has been placed, the Contractor may proceed with the placement of an adjoining section. Sections shall be placed alternately, first on one side and then on the other side of previously placed sections. Pours shall be scheduled so that two adjacent sides of each section are free, except at closures.
2. Walls: Walls shall be divided into sections by the construction joints shown on the Drawings. A section near the center of each wall shall be placed first. Sections shall be placed alternately, first on one side and then on the other side of the previously placed section. Pours shall be scheduled so that one end of each section is free, except at corner closures.
3. Footings: Footings, except for wall footings, shall be poured in one operation with no joints.

E. Requirements Due to Adverse Weather Conditions

1. No concrete shall be placed during rain. No concrete shall be placed if rain is forecast unless there is sufficient time to complete the placement and finishing. All concrete placed prior to rain shall be protected by whatever means necessary to prevent damage to finish or water entering the mix. Protection equipment and materials shall be on hand prior to placement operations. Freshly placed concrete shall be protected from scour by flowing water and from mud deposits or other injurious conditions.
2. Except as modified herein, cold weather concreting shall comply with ACI 306. The temperature of concrete at the time of placing shall be not less than that shown in the following table for the corresponding ambient outdoor air temperature (in shade) existing at the time of placement:

**Ambient Outdoor Air  
Temperature**

Below 35 °F  
Between 35 °F and 45 °F  
Above 45 °F

**Minimum Concrete  
Temperature**

70 °F  
60 °F  
45 °F

3. Placing of concrete when the ambient air temperature at the time of placement is 45°F or less shall be done only when specifically authorized by the Engineer using concrete heated in a manner acceptable to the Engineer. If the use of heated concrete is authorized, the temperature of the concrete at the time of placement shall not exceed 80°F.
4. Adequate means shall be provided for maintaining the temperature of the air surrounding the concrete at 70°F for three days, or 50°F for five days, or for as long as is necessary to ensure proper curing of the concrete. Rapid cooling of the concrete shall be prevented. Housing or covering or other protection used in connection with heating shall remain in place and intact at least 24 hours after the artificial heat is discontinued. Heating shall not produce carbon dioxide, such heaters shall not be utilized. The use of calcium chloride or other chemicals to prevent freezing shall not be permitted.
5. **Except as modified herein, hot weather concreting shall comply with the requirements of ACI 305. Hot weather precautions shall be taken whenever the maximum ambient outdoor air temperature (in shade) during the day exceeds 85°F. When rapid mixing water evaporation in transit causes the concrete to be delivered in an unworkable condition, initial correction may be made at the job site, provided that water added is in the form of a cement paste having the same water-to-cement ratio as the batch in the truck, and provided that the drum or mixer blades be operated at mixing speed for at least 70 revolutions after the paste addition. Once need for water has been observed, subsequent additions shall be at the batching plant until the need has passed. Correction shall consist of a simultaneous and proportionate increase of water and cement, up to 10 percent of the stated quantity of each material in the batch. Such increases in cement shall not constitute grounds for an increase in the contract price.**
6. **The temperature of concrete at the time of placement shall not exceed 85°F.**
7. **During hot weather, extra caution shall be taken to prevent rapid evaporation of water. Forms shall be kept cool by frequent wettings. Flat work shall be protected from drying winds, direct sun, and high temperatures whenever conditions of temperature and humidity are such as to cause plastic shrinkage cracking.**
8. **In order to prevent plastic shrinkage cracking due to rapid evaporation of moisture, no concrete shall be placed when the rate of evaporation, determined by using Figure 2.1.4 in ACI 305, equals or exceeds 0.2 pound per square foot per hour.**

### 3.7 FINISHING

- A. **Finishing Formed Surfaces:** All permanently exposed surfaces shall be expected to be smooth and of uniform texture and appearance. Surfaces to be rubbed shall include all submerged concrete surfaces that can be seen when water is drained. Rubbing may be omitted for minor blemishes on buried surfaces or on exposed surfaces that cannot normally be seen, such as inside covered tanks. Final determination for which surfaces are to be rubbed is to be the decision of the Engineer. All holes, pits or imperfections in the surface of the concrete shall be cleaned with a wire brush, thoroughly wetted and completely filled with damp cement mortar



composed of 1 part Portland cement to 2 parts fine aggregate. The entire surface shall be left smooth and all lines or markings shall be smoothed over to obtain uniform appearance. In the event the Contractor fails to obtain a satisfactory appearance of the concrete in the opinion of the Engineer, the entire surface shall be thoroughly wetted down, kept wet continuously and rubbed with a No. 20 carborundum stone until all lines, markings and surplus materials have been removed from the surface and until the surface shows a uniform smooth finish. After rubbing is completed the concrete surface shall be washed clean with water. Rubbing may be done either by hand or with power tools.

- B. Finishing Unformed Surfaces: No surface treatment will be required for buried or permanently submerged concrete not forming an integral part of a structure except that required to obtain the surface elevations or contours and surfaces free of laitance. The unformed surfaces of all other concrete shall be screeded and given an initial float finish followed by additional floating followed by troweling where required. Care shall be taken that no excess water is present when the finish is made. No special concrete or cement mortar topping course shall be used unless so shown on the Drawings.
1. Screeding
    - a. All slabs shall be screeded to an even surface by the use of a straight edge and screeding strips accurately and securely set to the proper level. Screeds shall be such type and so arranged so as not to interfere with the top bar reinforcement.
    - b. Screeding shall provide a concrete surface conforming to the proper elevation and contour with all aggregates completely embedded in mortar. All screeded surfaces shall be free of surface irregularities with a height or depth in excess of 1/4 inch as measured from a 10-foot straight edge.
  2. Floating
    - a. Screeded surfaces shall be given an initial float finish as soon as the concrete has stiffened sufficiently for proper working. Any piece of coarse aggregate which is disturbed by the float or which causes a surface irregularity shall be removed and replaced with mortar. Initial floating shall produce a surface of uniform texture and appearance with no unnecessary working of the surface.
    - b. Initial floating shall be followed by a second floating at the time of initial set. The second floating shall produce a finish of uniform texture and color. Unless additional finishing is specifically required, the completed finish for unformed surfaces shall be the float finish produced by the second floating.
    - c. Floating shall be performed with hand floats or suitable mechanical compactor floats.
  3. Brooming: Surfaces of equipment bases and curbs and sidewalks shall be given a light broom finish providing a nonslip surface. Brooming shall be done after the second floating and for traffic areas shall be at right angles to the normal traffic direction.
  4. Troweling: Surfaces to be covered with resilient floor coverings and other surfaces designated on the Drawings to be trowelled shall be steel trowel finished. Trowel finishing will not be required for floors which are normally submerged. Troweling shall be performed after the second floating when the surface has hardened sufficiently to prevent an excess of fines being drawn to the surface. Troweling shall produce a dense, smooth, uniform surface free from blemishes and trowel marks.
  5. Edging: All permanently exposed edges of unformed surfaces shall be chamfered with a  $\frac{3}{4}$ -inch approved edging tool unless other edge treatment is indicated on the Drawings.

### 3.8 CURING

- A. All concrete shall be protected from loss of moisture by curing for at least 14 days following placement. Curing operations shall take place immediately after concrete finishing is complete or forms are removed. Breaking of form ties or otherwise breaking the seal between the concrete surface and the form shall be considered form removal.
- B. Curing shall be accomplished by water curing, membrane curing, film curing, or any other curing method acceptable to the Engineer which does not injure or discolor exposed surfaces nor destroy the bond on surfaces to receive subsequent concrete pours or protective coatings.
- C. Water Curing
  - 1. Concrete surfaces being water-cured shall be kept constantly and visibly wet for a period of not less than 14 days. Water saturation of concrete surfaces shall begin as quickly as possible after the initial set of the concrete. The rate of water application shall be regulated to provide complete surface saturation with a minimum of runoff.
  - 2. Slabs poured on grade and decks may be water-cured by ponding or by covering with wet burlap sacks, sand, or sawdust and keeping this covering continually and visibly wet during this period. Standard canvas seep hose placed in parallel runs on 8-foot centers is recommended for ponding.
  - 3. Walls may be cured by leaving the forms tied in place and keeping the forms and all exposed surfaces of the concrete continually and visibly wet for the duration of the curing period.
- D. Membrane Curing
  - 1. Membrane-curing compound may be used in lieu of water curing on Class B concrete and on concrete which will not be covered later with mortar, liquid hardener, or additional concrete. Except as modified herein, membrane-curing compounds shall be applied in strict accordance with the manufacturer's recommendations. Membrane curing compounds shall conform to the requirements of Part 2.4, Membrane Curing Compound, of this specification section.
  - 2. Membrane-curing compound shall be spray applied in two separate coats, each having a surface coverage of not more than 300 square feet per gallon.
  - 3. Unformed surfaces shall be covered with curing compound within 30 minutes after final finishing. If forms are removed before the end of the specified curing period, curing compound shall be immediately applied to the formed surfaces before they dry out.
  - 4. Curing compound shall be suitably protected against abrasion during the curing period. Whenever the membrane will be subject to damage from traffic or other cause, it shall be protected after drying for 24 hours by a layer of sand or fine earth not less than one inch thick or by other means acceptable to the Engineer.
  - 5. Compound applied improperly or compound applied without sufficient dye to produce a distinguishing color shall be reapplied to the satisfaction of the Engineer.
- E. Film Curing
  - 1. Film curing with polyethylene sheeting may be used in lieu of water curing on concrete which will be covered later with mortar or additional concrete or will otherwise be covered or hidden from view.

2. Film curing shall begin as quickly as possible after initial set of the concrete. Polyethylene sheeting shall completely cover the surfaces. Sheeting shall overlap the edges sufficiently for proper sealing and anchorage. Joints between sheets shall be overlapped a minimum of 12 inches and sealed. All tears, holes, and other damage shall be promptly repaired. Covering shall be anchored continuously at edges and shall be anchored on the surface as necessary to prevent billowing.

### 3.9 CONSTRUCTION JOINTS

- A. Construction joints shall be made only at locations indicated on the Drawings or specified herein. Construction joints shall not be made at other locations without the concurrence of the Engineer. No vertical construction joints shall be used in walls unless specifically approved by the Engineer. The work shall be laid out and conducted so as to minimize the number of construction joints. Shop drawings shall show construction joint dimensions for location.
- B. All construction joints shall be keyed. Keys shall be continuous and shall have a width equal to 1/3 of the thickness of the wall and a depth equal to 1/6 of the thickness of the wall. Unless indicated otherwise on the Drawings no keys smaller than 3 inches in width and 1<sup>1</sup>/<sub>2</sub> inches in depth shall be used.
- C. Waterstops, of the type specified, shall be installed where indicated on the Drawings and in all construction joints in concrete walls and slabs having one face exposed in a dry pit or room and having the other face in contact with backfill, subgrade, ground water, or other liquid. Keyway dimensions shall be modified to allow waterstop clearance of steel reinforcing as approved by the engineer.
- D. Immediately prior to placing the next lift, the horizontal surface shall be thoroughly cleaned using water or air as required. The surface of the concrete shall then be covered by a uniform, evenly distributed layer of cement-sand mortar to a thickness of 1 inch. The cement-sand mortar shall be composed of a mixture of 1.3 parts by volume Portland cement and 1 part by volume fine aggregate and shall have a water-to-cement ratio equal to that of the concrete to follow.

### 3.10 EXPANSION JOINTS

Expansion joints shall be provided as shown on the Drawings. Details of the expansion joints and materials of construction shall be as shown on the Drawings and specified in these Contract Documents. If not shown on the Drawings, expansion joints shall consist of full-depth, preformed, 1/2-inch asphalt plank material conforming to ASTM D 994.

### 3.11 BONDING NEW CONCRETE TO EXISTING CONCRETE

- A. Where new concrete is to be cast against and permanently bonded to an existing concrete surface, the existing concrete shall be chipped or cut back from the surface a minimum distance of 1<sup>1</sup>/<sub>2</sub> inches or as necessary to expose sound concrete, remove loose or weathered concrete and provide a roughened surface for bonding to the new concrete. Edges shall be cut square and feathered edges will not be permitted. All loose material remaining after chipping or cutting operations shall be removed by sandblasting and/or stiff wire brushing.

- B. Where chipping back of existing concrete is not possible and where approved by the Engineer, the surface of existing concrete may be prepared by sandblasting or acid etching. If sandblasting or etching is used, the surface of the existing concrete shall be bare, clean, dry, and structurally sound. All grease, oil, wax, or other residue shall be removed by scraping followed by washing with a nonionic detergent or a suitable solvent compatible with the epoxy bonding agent to be used. Animal fats may be removed by scrubbing with a 10 percent solution of caustic soda to saponify them.
- C. After all loose material, grease, etc., have been removed, the surface of the existing concrete shall be etched by either sandblasting or scrubbing with a 10 to 20 percent solution of hydrochloric acid in water applied at a rate of 1 quart per square yard followed by a thorough rinsing with clean water. The surface shall then be allowed to dry completely before application of the epoxy bonding agent. Goggles, rubber boots, and rubber gloves shall be worn by workmen when applying caustic soda or acids.
- D. When the surface is dry and just prior to placing the new concrete, an epoxy bonding agent shall be applied to the surface of the existing concrete with a whitewash brush or stiff broom. The epoxy bonding agent shall be spread evenly over the surface to be bonded, avoiding skips and holidays, to wet film thickness of 40 to 60 mils. The new concrete shall be placed as soon as the epoxy bonding agent becomes tacky. In the event that the epoxy bonding agent is allowed to dry before placement of the new concrete the surface shall be recoated with epoxy.
- E. The epoxy bonding agent shall comply with the material requirements of Part 2.5, Epoxy Bonding Agent, of this specification section and shall be applied in strict conformance to the manufacturer's recommendations. Adequate safety precautions shall be taken during the handling and use of the epoxy bonding agent.

### 3.12 EMBEDDED ITEMS

- A. Wherever steel, wrought or cast iron piping, fittings, valves, collars, sleeves, structural steel, electrical conduits, appurtenances and fixtures, equipment anchorages or castings are shown or required for embedment in the concrete, such items must be on hand before concrete is poured. They shall be set in place accurately and firmly braced before concrete is poured around them. No cutouts for future installation of these items shall be permitted.
- B. Before placing concrete the Contractor shall see that all embedded parts are accurately positioned and firmly and securely fastened in place. They shall be thoroughly clean and free from any coating, rust, scale, oil or other foreign matter. The embedding of wood in concrete shall be avoided whenever possible. If wood is to be embedded it shall be thoroughly wetted before the concrete is placed. After placement, surfaces not in contact with concrete shall be cleaned of concrete spatter and other foreign substances.
- C. Conduit shall be installed between the reinforcing steel in walls or slabs that have reinforcement in both faces. In slabs that have only a single layer of reinforcing steel, conduit shall be placed under the reinforcement.
- D. Unless installed in pipe sleeves, anchor bolts shall have sufficient threads to permit a nut and washer to be installed on the concrete side of the form or template. A second nut and washer

shall be installed on the other side of the form or template and the two nuts shall be adjusted so that the bolt will be held rigidly in proper position.

- E. The Contractor shall be responsible for coordinating all work and ensuring that all embedded items or openings to be built into the concrete are placed in the forms before concrete is placed. The Contractor shall be responsible for conferring with his subcontractors and suppliers regarding their requirements for embedments and openings.
- F. Forms, sleeves, and inserts shall be set, and concrete shall be cast to the lines and grades indicated on the Drawings and as detailed in these Contract Documents. The maximum deviation from true line and grade shall not exceed the tolerances listed below. Deviation in alignment of slabs or walls shall not exceed a rate of 1/8 inch in 10 feet within the tolerances specified.

Item	Maximum Tolerance	
Sleeves and inserts	+1/8"	-1/8"
Projected ends of anchor bolts	+1/4"	-0.0"
Anchor bolt setting	+1/16"	-1/16"
Concrete forms	+1/8"	-1/8"

- G. All slabs shall be carefully finished true to grade such that the surface is free draining and contains no depressions which can hold or collect water.
- H. Regardless of the tolerances listed herein, it shall be the responsibility of the Contractor to limit deviations in line and grade to tolerances which will permit proper installation and operation of mechanical equipment and piping.

### 3.13 WATERTIGHTNESS

- A. It is the intention of this specification section to provide impervious concrete. All pits below groundwater level and all structures for holding or carrying water shall be watertight. A loss of not more than 1/4-inch depth in 24 hours will be permitted when water-holding structures are filled. All exposed surfaces of water-holding structures and interior surfaces of pits below groundwater level shall be free from visible damp spots or seepage before acceptance. Repeated tests and repairs may be required by the Engineer to obtain watertight structures. All structures shall be drained at the completion of tests unless otherwise directed by the Engineer. The cost and expense of all testing for watertightness and of providing a watertight structure shall be borne by the Contractor. Methods of repair shall be acceptable to the Engineer.
- B. The use of special admixtures or integral waterproofing compounds in concrete required to be watertight is not required but may be permitted, provided the materials and methods are approved in writing by the Engineer.

### 3.14 CONCRETE EMBEDMENT AND ENCASEMENT OF PIPE

- A. Concrete for embedment and encasement shall be installed where and as indicated on the Drawings and at such locations where installation conditions require such pipe reinforcement because of unforeseen conditions encountered in the work, as determined by the Engineer.

- B. Embedment and encasement of pipe shall be preceded by the following preliminary steps:
  - 1. All loose material shall be removed from the trench prior to placing concrete. All concrete shall have a continuous contact with undisturbed soil on sides and bottom of trench.
  - 2. A base course of concrete shall be accurately screeded to such grade and elevation that the pipe will be at specified grade when pipe bells are supported on, and in contact with, the top surface of such base course.
  - 3. Each length of pipe shall be rigidly held in alignment and anchored, to prevent flotation, in a manner acceptable to the Engineer.

### 3.15 PILE DRIVING AND CONCRETE WORK

The Contractor shall not drive foundation piling which may damage freshly placed or existing concrete structures. Minimum distance between concrete less than seven days old and pile driving operations shall be 100 feet. Any damage made to concrete structures from pile driving operations, regardless of distance, shall be repaired by the Contractor at his expense.

### 3.16 DEFECTIVE WORK AND METHODS OF REPAIR

- A. All defective or damaged work shall be removed and replaced or repaired as directed by the Engineer. Any work which has not been constructed in accordance with these Contract Documents shall be considered defective. No defective or damaged work shall be patched, repaired or covered without prior inspection and approval of the Engineer.
- B. Defects in formed concrete surfaces shall be repaired within 24 hours of placement, to the satisfaction of the Engineer, and defective concrete shall be replaced within 48 hours after the adjacent forms have been removed. All concrete which is honeycombed or otherwise defective shall be cut out and removed to sound concrete, with edges square cut to avoid feathering.
- C. Except as modified herein, concrete repair work shall conform to Chapter 9 of ACI 301 and shall be performed in a manner that will not interfere with thorough curing of surrounding concrete. All repair work shall be adequately cured.
- D. Where authorized by the Engineer, repair may be accomplished by patching conducted as specified herein. However, permission to patch shall not waive the Engineer's right to have the defective work completely removed if the patch or repairs do not, in the Engineer's opinion, satisfactorily restore the quality and appearance of the work. Patching shall be conducted as follows:
  - 1. Chip away defective areas at least 1½ inch deep perpendicular to the surface, wet the area and 6 inches around it to prevent absorption of water from patching mortar, and brush a sand-cement grout consisting of one part fine aggregate to one part Portland cement into the surface, following with patching mortar.
  - 2. Patching mortar shall be no richer than one part Portland cement to three parts fine aggregate using white Portland cement to replace a portion of the gray cement as determined by a trial patch and shall contain only the minimum mixing water required for placing.
  - 3. Mortar shall be compacted into place and screeded to leave the patch higher than the surrounding surface, then left undisturbed for one or two hours to permit initial shrinkage

before being finally finished to match the adjoining surface. Cure patch in accordance with the requirements of Part 3.8, Curing, of this specification section.

### 3.17 LOADS APPLIED TO NEW CONCRETE

- A. Loads including, but not limited to, earth loads, loads exerted from bracing or shoring, wind loads, hydrostatic or hydraulic loads, equipment or vehicle loads, or loads exerted by stacked materials, shall not be permitted until the concrete has reached its specified 28-day strength.
- B. Concrete which has cracked due to overloading, loading before required strength has developed, or otherwise damaged shall be repaired or replaced as determined by the Engineer at no expense to the Owner.

END OF SECTION

**DIVISION 5: METALS**



## SECTION 05120

### STRUCTURAL AND MISCELLANEOUS METALS

#### PART 1 GENERAL

##### 1.1 SCOPE

- A. This section covers all items fabricated from metal shapes, plates, sheets, rods, bars, or castings and all other wrought or cast metal except component parts of equipment and items covered by other sections.
- B. Fabricated metal items which are detailed on the Drawings but not mentioned specifically therein shall be fabricated in accordance with the applicable requirements of this section.

##### 1.2 SUBMITTALS

- A. Detailed shop drawings, product data sheets, and erection and installation details for miscellaneous metal items shall be submitted in accordance with the section entitled "Shop Drawings, Product Data and Samples" of these specifications. Submittals shall indicate thickness, type, grade, class of metal, and dimensions, and shall show construction details, reinforcement, anchorage, welds and fasteners, and installation with relation to other construction.
- B. Shop drawings shall be made to conform to the design drawings. Contract drawings shall take precedence over shop drawings unless otherwise authorized in writing. Review of the shop drawings by the Engineer does not constitute a change to the contract.
- C. The Contractor shall be responsible for all dimensions. He shall coordinate all dimensions with the requirements of the Contract Drawings and notify the Engineer of any discrepancy.

##### 1.3 DELIVERY, STORAGE, AND HANDLING

- A. Store miscellaneous metals above ground on platforms or other supports and protect from weather with suitable covering. Do not permit water ponding or moisture collection on stored items.
- B. Handle steelwork to prevent damage to members and to shop paint coat and to prevent accumulation of mud, dirt, or other foreign materials capable of interfering with field paint application.

## PART 2 PRODUCTS

### 2.1 BASIC MATERIALS

- A. All materials shall be new and undamaged and shall conform to pertinent AISC, ANSI, ASTM or other industry standards. Unless specified otherwise in other specification sections, all materials in fabricated metal items shall conform to the following requirements:
1. Structural steel shapes, plates, and bars shall conform to Specifications for Structural Steel ASTM A36.
  2. Structural steel tubing shall conform to ASTM A501.
  3. Stainless steel shall conform to the following AISI Type 304 for sheets and plates; AISI Type 316 for bolts and stainless steel items in corrosive areas.
  4. Galvanizing shall be hot dipped in accordance with Specifications for Zinc (Hot Galvanized) Coatings on Products Fabricated from Rolled, Pressed and Forged Steel Shapes, Plate, Bars and Strip ASTM A123.
  5. Gray cast iron shall conform to ASTM Specifications A48, Class 30B.
  6. Ductile iron shall conform to ASTM Specifications A536 Grade 60-40-18.
  7. Aluminum alloy shall conform to the following Aluminum Association Specifications and designations:
    - 6061-T6 - Structural shapes, tubes and pipes in corrosive areas, sheets, plates, wire, rods, bars, bolts, and screws.
    - 6063-T6 - Tubes and pipes in non-corrosive areas.
    - 6066-T6 - Welding and extrusions.
    - 6151-T6 - Forgings and forging stock.
  8. High strength steel bolts, nuts and washers shall conform to ASTM A325.
  9. All embedded anchor bolts or anchor bolt materials shall be ASTM A193, Grade B8; ASTM A276, Type 304; or IFI-104, Grade 304 stainless steel, threaded per ANSI B1.1. Nuts shall be heavy hex nuts, ANSI B18.2, semifinished pattern, and shall be ASTM A194, Grade 8 or IFI-104, Grade 304 stainless steel. Flat washers shall be 18-8 stainless steel and shall conform to ANSI B27.2.
  10. Expansion anchors shall be stainless steel, Type 303 or 305, and shall be of the cinch anchor, wedge, or self-drilling type. Expansion anchors shall conform to the applicable requirements of Federal Specifications FF-S-325. Installation methods shall be in conformance with the manufacturer's recommendations for maximum pullout and shear strength, but in no case shall the depth of the hole be less than four bolt diameters. The minimum distance between the center of the expansion anchor and an edge or exterior corner shall not be less than  $4\frac{1}{2}$  times the diameter of the hole in which it is installed. Expansion anchors shall be "Phillips Red Head" by Phillips Drill Company, "Wej-It" by Expansion Products, "Kwik-Bolt" by Hilti, Inc., or equal.

### 2.2 GENERAL REQUIREMENTS

- A. General - Except as otherwise specifically noted on the Drawings, or specified herein, all materials and work for structural steel and miscellaneous metal work shall be in conformity with applicable provisions of the latest edition of the *AISC Steel Construction Manual* and *AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings*.

## B. Connections

1. Connections not specifically detailed on the Drawings shall be as defined in Tables I and III, "Framed Beam Connections," in the latest edition of the AISC manual. The shop fabricated portion of structural connections may be bolted, welded, or riveted. Except for connections detailed on the Drawings or specified otherwise, field connections shall be made with ASTM A 325 high-strength bolts.
2. Connections for miscellaneous metal work not included in the AISC definition of structural steel may be made with unfinished bolts. All unfinished bolts shall be equipped with self-locking nuts or lock washers.
3. High strength bolts shall be installed using turn-of-nut tightening as described in "Specifications for Structural Joints Using ASTM A 325 or A 490 Bolts" as set forth in the AISC manual. Beveled washers shall be used when the bearing faces of bolted parts have a slope of 1:20 or greater with respect to a plane perpendicular to the bolt axis. A platform or other means of access shall be provided at each field connection and shall be left in place until the connection has been inspected by the Engineer.
4. Field welded connections will not be acceptable for structural steel unless shown on the Drawings or specifically permitted by the Engineer. Where structural or miscellaneous steel connections are welded, all butt and miter welds shall be continuous and where exposed to view shall be ground smooth. In addition, intermittent welds shall have an effective length of at least 2 inches and shall be spaced not more than 6 inches apart.

## C. Shop Fabrication

1. Structural steel and miscellaneous metal shall be fabricated in conformity with dimensions, arrangement, sizes, and weights or thicknesses shown on the Drawings or stipulated in the Specifications.
2. All members and parts, as delivered and erected, shall be free of winds, warps, local deformations, or unauthorized bends. Holes and other provisions for field connections shall be accurate and shop checked, so that proper fit will result when the units are assembled in the field. Erection drawings shall be prepared by the Contractor and reviewed by the Engineer in conformance with the "Supplementary General Provisions." Each separate piece shall be marked as indicated on the erection drawings. All field connection materials shall be furnished by the Contractor.
3. All steel shall be secured in position by temporary means until all final connections are completed. It shall be the responsibility of the Contractor to secure all steel against the displacement during erection and to maintain it against displacement until the structure, both concrete and steel, have been completed.
4. All bolts, including anchor bolts, shall have enough projection to expose not less than 12 threads (not inches) after nut is tightened.
5. Holes for expansion bolts shall be made by first securing the steel item in place then drilling the holes through the holes in the steel using the steel as a template. Drilling of the holes by center measurement will not be permitted. Reaming or burning of the holes in the steel will not be permitted. The drill size shall be of the same diameter as the bolt.

- D. Responsibility for Errors - The Contractor shall be responsible for all errors of detailing, fabrication, and for the correct fitting of the structural members. The Contractor shall make all measurements in the field to verify or supplement dimensions shown on shop drawings are coordinated with the dimensions and requirements of the plans, elevations, and sections.

## 2.3 STRUCTURAL ALUMINUM

- A. General - Except as specifically noted on the Drawings, or specified herein, all materials and work for structural aluminum shall conform with the applicable provisions of the latest edition of *Specifications for Aluminum Structures*, published by the Aluminum Association, Inc., New York, New York.
- B. Layout Out - Hole centers may be center punched and cutoff lines may be punched or scribed. Center punching and scribing shall not be used where such marks would remain on fabricated material. A temperature correction shall be applied where necessary in the layout of critical dimensions. The coefficient of expansion shall be taken as 0.000013 per degree F.
- C. Cutting - Material 1/2-inch thick or less may be sheared, sawed, or cut with a router. Material more than 1/2-inch thick shall be sawed or routed. Cut edges shall be true and smooth, and free from excessive burrs or ragged breaks. Edges of plates carrying calculated stresses shall be planed to a depth of 1/4 inch, except in the case of sawed or routed edges of a quality equivalent to a planed edge. Reentrant cuts shall be avoided wherever possible. If used, they shall be filleted by drilling prior to cutting. Flame cutting of aluminum alloys is not permitted.
- D. Heating - Structural material shall not be heated except as provided herein. Material may be heated to a temperature not exceeding 400°F for a period not exceeding 30 minutes to facilitate bending. Such heating shall be done only when proper temperature controls and supervision are provided to ensure that the limitations on temperature and time are carefully observed. The Engineer shall be so informed if this method is to be used.
- E. Punching, Drilling, and Reaming - Rivet or bolt holes may be punched or drilled to finished size before assembly. The finished diameter of holes for unfinished bolts shall be not more than 1/16 inch larger than the nominal bolt diameter. All holes shall be cylindrical and perpendicular to the principal surface. Holes shall not be drifted in such a manner as to distort the metal. All chips lodged between contacting surfaces shall be removed before assembly.
- F. Bolting - All bolts for bolting aluminum shall be Type 304 or Type 316 stainless steel, as specified herein.
- G. Welding
  - 1. Dirt, grease, forming or machining lubricants, or any organic materials shall be removed from the areas to be welded by cleaning with a suitable solvent or by vapor degreasing. Additional operations to remove the oxide coating just prior to welding are required when the inert gas tungsten arc welding method is used. This may be done by etching or by scratch brushing. The oxide coating may not need to be removed if the welding is done with the automatic or semi-automatic inert gas shielded metal arc. Suitable edge preparation to assure 100 percent penetration in butt welds shall be used. Oxygen cutting shall not be used. Sawing, chipping, machining or shearing may be used.
  - 2. Any welding of aluminum shall be done using a non-consumable tungsten electrode with filler metal in an inert gas atmosphere (TIG) or using a consumable filler metal electrode in an inert gas atmosphere (MIG). No welding process that requires the use of a welding flux shall be used unless prior approval has been obtained from the Engineer. Preheating for welding is permissible provided the temperature does not exceed 400°F for a total

time of 30 minutes. Welding of any structure which is to be anodized shall be done using filler alloy rods which will not discolor when anodized.

3. The welding process and welding operators shall both meet a qualification test conforming to the qualification methods described in the ASME *Boiler and Pressure Vessel Code*, Section IX, "Welding Qualifications."

#### H. Corrosion Protection

1. Before installation, aluminum surfaces to be placed in contact with wood, concrete, or masonry construction shall be given a solvent cleaning followed by two (2) coats of Glidden "Glid-Guard Top Service Thick Black," Tnemec "46-449 Heavy Duty Black," Indurall "J-1135 Coal Tar Coating," or equal applied to a minimum dry film thickness of 10.0 mils per coat. The paint shall be applied as it is received from the manufacturer without addition of any thinner. Where aluminum surfaces come in contact with dissimilar metals, except stainless steel, the aluminum surfaces shall be kept from direct contact with said metal by the use of neoprene gaskets, 10 mil polyethylene film, or insulating washers. Paint or galvanizing will not be considered as adequate protection.
2. Unpainted aluminum surfaces shall be cleaned of all fabrication markings, grease, dirt, and oil. Anodized surfaces shall be cleaned with a mild soap and water solution, and no acid, caustic, or abrasive cleaning agents shall be used.

#### 2.4 CHECKERED FLOOR PLATES

- A. Unless otherwise shown, checkered floor plates shall be 6061-T6 aluminum alloy with raised diamond pattern on the upper surface. Floor plate shall have a minimum thickness of  $\frac{1}{4}$  inch and shall be designed for an extreme fiber stress in bending of not more than 10,000 psi and a deflection of not more than  $\frac{1}{300}$  of span under a uniform load of 200 pounds per square foot. However, in no case shall the thickness of the floor plates be less than that shown on the Drawings for the specified clear span.
- B. Warped or bent checkered plates shall be shop-straightened so they will lie perfectly flat. Members which support checkered plates shall be aluminum or stainless steel.

#### 2.5 TESTING AND INSPECTION

- A. Prior to delivery all basic materials specified herein shall be tested and inspected by an approved independent commercial testing laboratory. Payment for such services will be made by the Contractor. If approved by the Engineer, certified tests performed by the manufacturer's testing laboratory at no cost to the Owner will be acceptable.
- B. If so desired by the Engineer, inspection of the fabrication shall be made at the place of manufacture. Access shall be permitted to all places where the work is being done.
- C. Materials or workmanship not conforming to the provisions of these Specifications shall be rejected at anytime defects are found during the progress of the work.

END OF SECTION

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**DIVISION 15: MECHANICAL**

## SECTION 15001

### PIPE WORK GENERAL PROVISIONS

#### PART 1 GENERAL

##### 1.1 DESCRIPTION OF WORK

- A. Work under this Section includes all material certificates; Shop Drawings; disinfection of potable water mains; and field testing of all pipe, pipe fittings, piping specials, and valves in all sections necessary to complete and make serviceable all piping systems.
- B. The requirements of this Section apply to the work in the following Sections:
  - 1. Section 15001, Pipe Work General Provisions
  - 2. Section 15061, Steel and Alloy Piping and Copper Tubing
  - 3. Section 15062, Ductile Iron Piping and Ductile Iron and Cast Iron Fittings
  - 4. Section 15064-A, PVC Pressure Pipe
  - 5. Section 15064-B, Polyvinyl Chloride Sewer and Service Pipe
  - 6. Section 15090, Pipe Couplings and Expansion Joints
  - 7. Section 15101, Valves

##### 1.2 QUALITY ASSURANCE

- A. Codes and Standards: Comply with the provisions of the following codes and standards except as otherwise shown or specified.
  - 1. AWWA: All applicable standards.
  - 2. Florida Department of Environmental Protection: All rules and regulations.

##### 1.3 SUBMITTALS

- A. Material Certificates: Provide materials certificates signed by the material manufacturer and the Contractor for all pipe and pipe fittings. Certify that each material item complies with the specified requirements.
- B. Shop Drawings: Submit Shop Drawings for all valves and special items, restrained joint systems for all systems, and laying schedules in accordance with Section 01340 of these Specifications.

#### PART 2 PRODUCTS

##### 2.1 TEST RESULTS

The Contractor shall conduct all tests in the presence of the Engineer. Test results shall be certified to the Owner in writing.



## 2.2 TESTING OF PRESSURE PIPING SYSTEMS

- A. Each section of piping shall be tested to a hydrostatic pressure of 150 psi (minimum) or 50 psi above the working pressure. The Contractor is required to furnish all pumps, gauges, instruments, test equipment, and personnel required for the tests, and make provisions for removal of test equipment and draining of pipes after tests have been made. All testing shall be made in the presence of the Engineer.
- B. The pressure tests shall be sustained for not less than two hours and as long as the Engineer may require to assure that:
  - 1. No air pockets are in the line.
  - 2. No broken pipe or defective materials are in the line.
  - 3. No leaking joints have been made.
- C. Before applying the specified test pressure, all air shall be expelled from the pipe. If outlets are not available at high places, the Contractor shall make the necessary taps at points of highest elevations before the test is made. After the test has been completed, corporation cocks shall be installed at these points and marked by the installation of a valve box.
- D. Tests may be made of isolated portions of such piping as will facilitate general progress of the installation. Any revisions made in the piping systems will subsequently necessitate retesting of such affected portions of the piping systems.
- E. Where city water service is available, reasonable amounts of water for flushing and testing will be furnished by the Owner at no cost to the Contractor subject to requirements which the Owner may impose.
- F. Any defective material or defects in workmanship that become apparent during the tests shall be remedied and the subject piping shall be retested.
- G. Prior to pressure testing of buried piping, backfill shall have been partially placed and tamped to provide adequate side support for all pipe and fittings. At joints, trenches shall be sufficiently open for joint inspection.
- H. All piping systems shall be thoroughly flushed by providing a velocity of 2<sup>1</sup>/<sub>2</sub>-feet per second in the line being flushed.
- I. Do not test against closed valves at pressures higher than the allowable seating pressures for individual valves. Contractor may test open valves at pressures up to that specified for the valve bodies. In sections of the line where the test pressures are greater than the allowable seating pressures for the valves, the Contractor shall provide temporary plugs to test against.
- J. The leaking tests which may be performed at the same time as the pressure tests shall be sustained for not less than 2 hours. The leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe or any valved section thereof to maintain the specified leakage test pressure after the air in the pipe line has been expelled and the pipe has been filled with water.

- K. No pipe line installation will be accepted if the leakage is greater than that determined by the following formula:

$$L = \frac{NDP^{0.5}}{7400}$$

L = allowable leakage in gallons per hour

N = number of joints in length of pipe line tested

D = nominal diameter of pipe in inches

P = average test pressure during leakage test in pounds per square inch

## 2.3 TESTING GRAVITY FLOW PIPING

### A. General:

1. The following procedures apply only to the storm drainage systems. Tests for this piping may be waived at the Engineer's discretion.
2. Field testing of gravity flow pipes, including manholes, for joint integrity and water tightness shall be conducted by either an infiltration test or an exfiltration test. The Contractor shall furnish all plugs, pumps, piping, gauges, timers, instruments, required test apparatus, and all labor required for installing the testing equipment, conducting the test, and removing the testing apparatus after the tests have been completed. All testing shall be done in the presence of the Engineer.
3. The Engineer will determine the type of test required for each section after the ground water table has been measured by the Contractor. The following general criteria will govern the type of test to be conducted.
  - a. Wherever the ground water table is measured to be not less than 1 foot above the top of the pipe throughout the full length in the section being tested, an infiltration test shall be used.
  - b. Wherever the ground water table is measured to be less than 1 foot above the top of the pipe at the highest point in the section being tested, an exfiltration test shall be used.

### B. Measuring Ground Water Table:

1. The Contractor shall provide facilities for measuring the ground water table at intervals equal to and not greater than the manhole spacing, etc., one probe per manhole.
2. Maximum allowable leakage permitted under this Specification is 25 gpd/inch of pipe diameter/mile for sanitary lines and 100 gpd/inch of pipe diameter/mile of pipe for storm water systems. The permissible leakage rate is established for either the infiltration or exfiltration test.
3. Testing, whether for infiltration or exfiltration, is to be performed by standard methods and are to be approved by the Engineer prior to conducting the tests.

### C. Testing Gravity Flow Lines by Visual Inspection: All gravity flow sewers 18 inches diameter and smaller shall be subject to testing by visual inspection for alignment and grade. A section of pipe between two manholes will have passed the test when a light held in a manhole will show a full circle when viewed from an adjoining manhole through the carrier pipe. Visual inspection is in addition to I/E tests.

### D. Failures: If, for any reason, a section of pipe fails either of the tests previously outlined or any substitute test procedure approved by the Engineer, the Contractor shall locate the defective

materials and/or installation and make any necessary repairs. After the corrective actions have been taken, the section of pipe shall be retested subject to the same provisions or requirements outlined above.

#### 2.4 RELATIONSHIP OF SEWERS TO WATER MAINS

- A. Sewer Parallel to Water Main: Sewers shall be located, during design, at least 10 feet horizontally from any existing or proposed water main. If, for absolutely essential reasons, it is not possible to achieve such separation, the sewer may be located not less than 3 feet from a water main - horizontally, provided there is at least 18 inches vertical separation between the bottom of the water main and the top of the sewer, with the sewer below the water main.
- B. Vertical Separation: Whenever sewers must cross under water mains, the sewer shall be laid at such an elevation that the top of the sewer is at least 18 inches below the bottom of the water main. When the elevation of the sewer cannot be buried to meet the above requirement, the water main shall be relocated to provide this separation or reconstructed with slip-on or mechanical-joint ferrous pipe for a distance of 10 feet on each side of the sewer. One full length of water main pipe should be centered over the sewer so that both joints will be as far from the sewer as possible.
- C. Special Conditions: When it is impossible to obtain proper horizontal and vertical separation as stipulated above, the water main should be constructed of slip-on or mechanical-joint ferrous pipe and the sewer constructed of mechanical-joint ferrous pipe and both services should be pressure tested to assure watertightness.
- D. Must meet all applicable Florida Department of Environmental Protection and local codes and regulations.

END OF SECTION

## SECTION 15010

### BASIC MECHANICAL REQUIREMENTS

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES:

Basic mechanical requirements specifically applicable to Division 15 Sections, except as otherwise specified in these sections.

##### 1.2 SYSTEM COMPLETENESS

Provide systems complete, workable and ready for operation. Make all corrections as required from engineers or building officials' construction review comments.

##### 1.3 SUBMITTALS

- A. Provide sets of submittals for HVAC equipment, plumbing fixtures, controls, insulation, test and balance, etc. in accordance with architectural requirements. Contractor providing submittal shall neatly organize and bind divider tabs by specification section. Submittals shall be reviewed by engineer. Equipment and materials not specified or manufacturers not listed shall require 10 day prior approval. Submittal reviews beyond two shall be subject to a professional service penalty to engineer at \$75/hour.
- B. Certificates
  - 1. Proof of compliance.
  - 2. Submit proof that materials or equipment specified comply with requirements of independent agencies such as Underwriters Laboratories Inc. (UL), American National Standards Institute, Inc. (ANSI), Air-Conditioning and Refrigeration Institution (ARI), American Society of Heating, Refrigeration and Air-Conditioning Engineers, Inc. (ASHRAE), and Air Movement and Control Association, Inc. (AMCA). Label or listing of specified agency is acceptable as evidence of compliance, or Contractor may submit a written certification from an approved, independent, nationally recognized testing laboratory that is adequately equipped and competently staffed to perform the required services. Provide certification, listing items tested and specific, applicable requirements of tests required by specific agency.

##### 1.4 ELECTRICAL WORK

- A. HVAC contractor shall provide HVAC equipment specified herein complete with motors and contactors, and controls.
- B. Provide manual or automatic control and protective or signal devices required for operation specified or indicated.
- C. Provide control wiring required for control devices but not shown on the electrical plans.

- D. Provide additional electrical work required by mechanical equipment substitutions under Division 15.
- E. All equipment provided with 3-phase power supply shall have balanced loads to within 5 percent on each leg.

#### 1.5 STANDARD PRODUCTS

Unless otherwise indicated or specified, provide standard products of manufacturers regularly engaged in production of such equipment and provide the manufacturer's latest design. Provide all items of the same type or rating identical.

#### 1.6 DELIVERY, STORAGE, AND PRODUCT HANDLING

- A. Deliver, store, and protect and handle products to site per manufacturer's instructions per architectural requirements.
- B. Repair or replace equipment with dents and other surface damage. Repair painted surfaces previously accepted by owner.

#### 1.7 ON-SITE CONFERENCES AND ON-SITE TESTING

Notify engineer and owner for on-site conferences and on-site review and tests. Apply these requirements to the following:

- A. Inspection of work above ceiling before ceiling installation.
- B. Final tests and demonstrations of mechanical systems.
- C. Review meeting on temperature control system.
- D. Inspection and verification of duct pressure tests and test and balancing.

#### 1.8 COORDINATION OF WORK

- A. Other Trades
  - 1. Coordinate mechanical work with other trades involved in the construction project. Provide drops, rises, or offsets not indicated but necessary for proper installation of work. Carefully lay out all work in advance to coordinate with architectural, structural, mechanical, and electrical features of construction. Verify at site all locations, grades, elevations, and utility service connections indicated. Make required changes or relocations necessary to resolve any conflicts.
  - 2. Contractor shall coordinate all work with the owner so as to reduce as much as possible to effect that all construction might have on day-to-day activities.
- B. Drawings - The Drawings indicate extent and general arrangement of equipment, piping, and ductwork. Request approval for any departures deemed necessary. Make no departure without written approval.

- C. Clearances - Fit equipment into space allotted and allow adequate clearances for entry, installation, replacement, servicing, and maintenance. Coordinate work to ensure equipment may be moved into place without altering building components or other installations. Provide access space not less than the equipment manufacturer's requirements.
- D. Above Ceilings - Completely install, test, and approve mechanical work located above ceilings prior to installation of finished ceilings. Prior to inspection, ceiling suspension system may be installed as required for coordination with mechanical work.

## PART 2 PRODUCTS

All equipment shall be per specifications. Approved equals to quality of basis of design shall be considered with 10 day prior approval. Products by manufacturers not listed as approved shall be rejected.

## PART 3 EXECUTION

### 3.1 EQUIPMENT INSTALLATION

- A. Provide final connections to equipment, including pipe, duct, and temperature controls, under applicable sections of this Division, unless otherwise specified or indicated. Contractor shall follow construction documents. Reports shall be made by engineer at each construction review. If contractor fails to comply with installation requirements of equipment duct sealing, controls, insulation, etc., corrections shall be made to comply with design documents. Insufficient submittal or construction review beyond three chances to comply shall be subject to a professional service penalty to engineer at \$80/hour.
- B. Manufacturer's Instructions - Install equipment as recommended by manufacturer to conform to requirements of the particular application, in accordance with Drawings and Specifications.

### 3.2 FOUNDATIONS, BASES, AND SUPPORTS

Properly support equipment, ductwork, and piping. Provide required frames, braces, hangers, anchors, and supports.

- A. Suspended Equipment
  1. Brace and support suspended equipment inside buildings to provide a rigid installation.
  2. Provide steel supports attached to bearing walls or roof or floor support framing members only.
  3. Do not attach supports to metal roof decks and do not penetrate cellular floor decks.
  4. Provide cross bracing as required.

### 3.3 LUBRICATION

- A. Lubricate equipment in accordance with equipment manufacturer's instructions before it is initially operated.

- B. Check equipment and relubricate during construction and directly before final acceptance.

### 3.4 ADJUSTMENTS AND PRELIMINARY TESTS

Before equipment is started and systems are used, clean piping, ductwork, and equipment and perform the following adjustments and preliminary tests.

- A. Fans and Air-Handling Units
  - 1. Check for freedom of movement of fan wheel, bearing lubrication, and cleanliness.
  - 2. Before air balancing is begun, check all fans for proper direction of fan wheel rotation by “bump-starting” each fan individually.
- B. Dampers and Associated Equipment - Before air balancing is begun, visually check, adjust, and correct the following:
  - 1. Damage to coil fins and sensing elements.
  - 2. Damper clearances.
  - 3. Damper seating.
  - 4. Freedom of damper movement.
  - 5. Position of blades versus quadrant indication.
  - 6. Movement of fire dampers.
  - 7. Location, access to, and fitting of fusible link assemblies.
  - 8. Installation and securing of turning vanes.
  - 9. Flexible Connections.
  - 10. Before the system is filled, check pipe alignment at flexible connections by loosening the flange bolts or threaded fitting and noting the offset between mating surfaces.
  - 11. Eliminate any offset by re-piping as required.
  - 12. Replace any damaged connector.
- C. Static Pressure and Other Testing Requirements - Other testing requirements of piping and ductwork systems specified in this Division are described in the applicable sections.

### 3.5 OPERATING INSTRUCTIONS

- A. After equipment and services are in operation, the operation and maintenance data are available, and prior to substantial completion, conduct an instruction and training session for the Owner’s operating personnel.
- B. Conduct instruction sessions during the Owner’s normal working periods, and at times and locations satisfactory to Owner. Whenever deemed applicable by the Owner, instruction period may be divided into two 4-hour sessions, 1 session during heating season and 1 session during cooling season.
- C. Provide the following instruction and demonstration of operation:
  - 1. Temperature and Associated Controls. Provide instruction and demonstration for operation and maintenance given by competent factory-trained service and operating personnel from the appropriate manufacturer. Record names of personnel present at each training session.

### 3.6 EQUIPMENT START-UP

Do not place equipment in operation until it has been cleaned as required by 3.7 below, inspected by a qualified representative of the manufacturer and is certified to be ready for operation. Manufacturer's representative shall supervise the startup operation and shall be responsible for all adjustments required to meet design conditions.

### 3.7 CLEANING

Clean ductwork and equipment prior to application of paint or coverings. Prior to substantial completion, provide the cleaning as follows:

#### A. Cleaning of Exterior Surfaces

1. Remove all traces of dust, dirt, paint overspray, debris, etc. from exterior surfaces of ductwork and equipment.
2. Wash and wipe, using solvent or detergent as required.
3. Repair damage occurring to equipment before final acceptance.
4. Replace equipment if suitable repairs cannot be made.
5. Restore factory-finished items to like-new condition.
6. Cleaning of Interior Surfaces
7. Clean inside of plenums, casings, and ductwork free of construction debris.
8. Provide new filters in air-handling units after cleaning is complete.
9. Do not operate air-handling units for testing or any other purpose unless filters are installed.
10. Replace or patch torn insulation as required.
11. Wipe clean and wash down coil fin surfaces and fan blades.
12. Straighten damaged coil fin surfaces with standard coil fin combing tools.

### 3.8 FINAL TESTS AND DEMONSTRATIONS

Upon completion of the work, but prior to substantial completion, demonstrate operation of mechanical systems. If any system does not perform satisfactorily, make adjustments and corrections until satisfactory operation is achieved.

END OF SECTION



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SECTION 15064-A  
PVC PRESSURE PIPE

PART 1 GENERAL

1.1 SCOPE

- A. The work covered by this section includes furnishing all labor, equipment, and materials required to install and test polyvinyl chloride (PVC) pressure pipe, including valves, unions, fittings, couplings, adaptors, and accessories, as shown on the Drawings and/or specified herein.
- B. The Contractor's attention is called to the fact that all PVC piping and accessories are not necessarily shown completely on the Drawings which are more or less schematic. However, the Contractor shall furnish and install all piping indicated or required for proper operation of the equipment or services requiring such piping.

1.2 QUALITY ASSURANCE

- A. The Contractor, at the Engineer's request, shall furnish a certificate from the manufacturer of the pipe and fittings that the manufacturer is fully competent and capable of manufacturing PVC pipe and fittings of uniform texture and strength that will fully comply with these specifications and have so manufactured this class of pipe in sufficient quantities to be certain that it will meet all normal field conditions of usage. The manufacturer must have adequate equipment and quality control facilities to be sure that each extrusion of pipe is uniform in texture, dimensions, and strength.
- B. All pipe shall be tested and inspected at the place of manufacture for all requirements of the latest ASTM and commercial standard tests and certified copies of the test reports covering each shipment shall be submitted to the Engineer prior to laying.
- C. Each length of pipe and each fitting shall have the following data clearly marked on each piece:
  - 1. Nominal size
  - 2. Type and grade of material and ASTM standard
  - 3. SDR, class, or schedule rating
  - 4. Manufacturer
  - 5. National Sanitation Foundation's seal of approval

1.3 SHOP DRAWINGS AND ENGINEERING DATA

Complete shop drawings and engineering data shall be submitted to the Engineer in accordance with the requirements of the section entitled "Submittals" of these Specifications.

## 1.4 STORAGE AND PROTECTION

- A. PVC piping and accessories shall be stored and protected in accordance with the requirements of the section entitled "General Equipment Stipulations" of these Specifications.
- B. PVC pipe and fittings shall be stored under cover.
- C. All pipe and accessories shall be stored aboveground and fully supported so as not to bend or deflect excessively under its own weight. Height of stacked pipe shall not exceed 4 feet. Bundled pipe shall not be stacked more than two bundles high.
- D. Kinked, flattened, buckled, broken, or otherwise defective pipe and fittings shall not be used and shall be removed from the site.
- E. Pipe shall be handled using nylon slings. Wire rope slings or chains shall not be

## used. 1.5 GUARANTEE

Provide a guarantee against defective equipment and workmanship in accordance with the requirements of the section entitled "Guarantees and Warranties" of these Specifications.

## PART 2 PRODUCTS

### 2.1 PVC PIPE AND FITTINGS

- A. The pipe and fittings shall be homogenous throughout and free from visible cracks, holes, foreign inclusions, or other injurious defects. The pipe shall be as uniform as commercially practical in color, opacity, density, and other physical properties.
- B. The manufacturer shall provide waterstops, acceptable to the Engineer, which shall be applied to the outside of plastic pipe when the pipe is to be enclosed in any structure where concrete or mortar is used which will prevent leakage along the outer wall of the barrel of the pipe.
- C. No single piece of pipe shall be laid on any project covered by this specification unless it is found to be generally straight. Such pipe shall have a maximum ordinate as measured from the concave side of the pipe not to exceed 1/16-inch per foot of length. If the deviation from straightness exceeds this requirement, then the particular piece of pipe shall be rejected for use until it can comply with this provision.
- D. Wyes, tees, bends, and adapters and any other fittings required or directed by the Engineer shall be constructed of ductile iron as directed in Section 15062 of these Specifications. Engineering data for such fittings showing cross-sectional views with dimensions shall be provided and such data and fittings shall be approved by the Engineer prior to their use. The materials used in the manufacture of fittings shall conform with the requirements for the pipe with which they shall be used and any variation of such requirements shall be subject to the approval of the Engineer. Fittings shall have wall thicknesses equal to or greater than that of the pipe to which they are joined.

## 2.2 PIPE

- A. PVC pipe shown on the Drawings to be installed outside of structures or buried underground and used to convey water or wastewater shall have push-on joints unless otherwise noted on the Drawings. All pipe material shall be Grade 1, Type I, polyvinyl chloride (PVC) in accordance with ASTM D 1784, Class 12454-B. All pipe material shall be National Sanitation Foundation approved for use with potable water. Pipe in sizes 1<sup>1</sup>/<sub>2</sub>-inches through 3 inches (1/2 inches through 12 inches for corrosive fluids) shall be SDR 21 with 200 psi pressure rating in accordance with ASTM D 2241. Pipe in sizes 4 inches through 12 inches shall be either SDR 21 with 200 psi pressure rating in accordance with ASTM D 2241 or Class 200 in accordance with AWWA C 900, depending on which is called for on the Drawings or in the Bid Schedule. Maximum lengths of pipe shall not exceed 20 feet.
- B. PVC pipe shown on the Drawings to be installed inside of structures or used to transport liquid or gaseous chlorine shall have threaded joints. Solvent welding of field joints will not be permitted. PVC for threaded joints shall be Schedule 80, National Sanitation Foundation approved and shall conform to the latest requirements of Commercial Standard CS 207 and ASTM D 1785 for Schedule 80 water pressure ratings. Pipe material shall be Type I, Grade 1, in accordance with the requirements of ASTM D 1784, Class 12454-B. Fittings shall comply with the requirements of ASTM D 2464 for molded, Schedule 80, screwed fittings.
- C. When operating temperatures exceed 140°F, pipe material shall be chlorinated polyvinyl chloride (CPVC) in accordance with ASTM D 1784, Type IV, Grade 1, Class 23477-B.

## 2.3 FITTINGS

- A. All fittings required in PVC piping systems conveying water or wastewater shall be cast iron or ductile iron as specified in Section 15062 of these Specifications. Engineering data for fittings showing cross-sectional views with dimensions shall be provided and such data and fittings shall be approved by the Engineer prior to their use. Connections between cast iron or ductile iron fittings and PVC pipe shall be made by use of special adaptors similar to Mueller Transition Gland A-399 by Mueller Co., Transition Gasket F6340 by Clow Corporation or a similar transition which has been approved by the Engineer. The joint shall be mechanical joint for ductile iron or cast iron as described in Section 15062 of these Specifications.
- B. Fittings for PVC pipe inside of structures or used to convey liquid or gaseous chlorine shall comply with the requirements of ASTM D 2464 for Molded, Schedule 80, screwed fittings.

## 2.4 PVC VALVES AND STRAINERS

- A. Unless otherwise shown or required, all valves, unions, and strainers in PVC piping shall be constructed of Type I, Grade 1 PVC. Valves shall be NSF approved and shall have a working pressure of 150 psi.
- B. Ball valves shall have double union type body, Teflon seats, Viton seals, full diameter port, and NPT threaded ends. Ball valves in 4-inch size may have single union body.
- C. Check valves shall be of the ball type with union body, Viton seat, and NPT threaded ends.

D. Strainers shall be of the wye type with NPT threaded ends and 8 or 10 mesh strainer basket.

## 2.5 JOINTS

### A. Push-On Joints

1. The joints shall be designed so that the pipe and fittings may be connected on the job without the use of solvent cement or any special equipment. The push-on joint shall be single rubber gasket joint designed to be assembled by the positioning of a continuous, molded, rubber ring gasket in an annular recess in the pipe or fitting entering pipe into the socket thereby compressing the gasket radially to the pipe to form a positive seal. The gasket and the annular recess shall be so designed and shaped that the gasket is locked in place against displacement as the joint is assembled. Details of the joint design and assembly shall be in accordance with the joint manufacturer's standard practice. The joints shall be designed so as to provide for the thermal expansion or contraction experienced with a total temperature change of at least 75°F in each joint per length of pipe. The joint shall comply with ASTM D 3139. Gasket shall comply with ASTM F 477.
2. Lubricant furnished for lubricating joints shall be nontoxic, shall not support the growth of bacteria, shall have no deteriorating effects on the gasket or pipe material, and shall not impart color, taste, or odor to water. The lubricant containers shall be labeled with the manufacturer's name.
3. Gaskets shall meet all applicable requirements of ANSI A21.11. Gasket dimensions shall be in accordance with the manufacturer's standard design dimensions and tolerances. The gasket shall be of such size and shape as to provide an adequate compressive force against the spigot and socket after assembly to affect a positive seal under all combinations of joint and gasket tolerances. The trade name or trademark, size, mold number, gasket manufacturer's mark and year of manufacture shall be molded in the rubber on the back of the gaskets.
4. Gaskets shall be vulcanized natural or vulcanized synthetic rubber. No reclaimed rubber shall be used. When two hardnesses of rubber are included in a gasket, the soft and hard portions shall be integrally molded and joined in a strong vulcanized bond. They shall be free of porous areas, foreign material, and visible defects. The required properties of the gasket rubber and the required method of test are given in the following table:

ASTM Test Property	Method	Main Body of Gasket	Harder Portion (if used)
Hardness, Durometer "A"	D 676 at 76" 6°F	45-70	78-90
Minimum Ultimate Tensile, psi	D 412	2,000	1,200
Minimum Ultimate Elongation, Percent <sup>1</sup>	D 412	300	125
Minimum Aging, Percent <sup>2</sup>	D 572 <sup>3</sup>	60	60

<sup>1</sup> Of original length.

<sup>2</sup> Of original values of tensile and ultimate elongation.

<sup>3</sup> Oxygen pressure method: After 96 hours at 70 °C at 300 +10 psi.

5. The gasket manufacturer shall set up such quality control procedures as will ensure the gasket's meeting the requirements of this standard. He shall furnish a monthly report of representative quality control test results to the pipe manufacturer.
  6. A sample push-on fitting shall be submitted to the Engineer for examination and approval prior to delivery of any pipe.
- B. Threaded Joints
1. Joints shall be made with American Standard IPS threads. All joints shall be made up with Teflon thread tape or thread dope or with pipe manufacturers recommended joint compound for use with chlorine solution.
  2. All fittings shall be Schedule 80 with screwed joints. Gaskets for flange fittings and unions shall be as recommended by pipe manufacturer for use with chlorine solution.

## PART 3 EXECUTION

### 3.1 LAYING PIPE

- A. All provisions with respect to trenching, backfilling, bedding, and pipe laying shall conform to the applicable requirements of the sections entitled "Earthwork" and "Ductile Iron Piping and Ductile Iron and Cast Iron Fittings" of these Specifications.
- B. All provisions with respect to connections and existing utilities shall comply with the applicable requirements of the section entitled "Ductile Iron Piping and Ductile Iron and Cast Iron Fittings" of these Specifications.
- C. Exposed piping shall be supported in accordance with the requirements of the section entitled "Pipe Supports and Hangers" of these Specifications. Metal valves and valve boxes shall be supported independently of piping. PVC piping shall be isolated from direct contact with metal or concrete supports by a 1/32-inch sheet of neoprene.
- D. When a joint consists of a PVC flange and a metal flange, the metal flange shall be flat faced and furnished with a full face resilient gasket.
- E. PVC valves shall be installed with the flow arrow in the proper direction. Union nuts on PVC valves shall be tightened only hand tight in accordance with manufacturer's instructions. Spare O-ring seals and seats shall be furnished with each PVC valve.
- F. Where specifically shown or called for on the Drawings, service line taps into PVC pipe shall be made using tapping saddle constructed for use on PVC pipe. The saddle shall be constructed of bronze or brass, shall have all stainless steel bolts or screws, and have a resilient rubber gasket to provide a positive, watertight seal.
- G. PVC pipe laid underground shall have a minimum of 36 inches of cover in traffic areas and 30 inches of cover in non-traffic areas.

### 3.2 FIELD TESTING

- A. After all piping has been placed and backfilled between the joints, each run of newly laid pipe, or any valved section thereof, shall be tested by the Contractor in the presence of the Engineer, and tests shall be continued until all leaks have been made tight to the satisfaction of the Engineer.
- B. All piping shall be subject to a hydrostatic gauge pressure equal to the rated pressure class of the pipe being tested. The allowable leakage shall be as shown in Table 1. The duration of the test shall be a minimum of 2 hours.
- C. The Contractor shall take all precautions necessary to protect any equipment that might be damaged by the pressures used in the tests. Delicate equipment shall be valved off, removed, or otherwise protected.
- D. All piping shall be securely anchored and restrained against movement prior to application of test pressures. Prior to the pressure test, pipe laid in trenches shall be partially backfilled adequately to secure the pipe during the test. All joints, fittings, and valves will be left open where possible. All exposed pipe, fittings, valves, and joints shall be carefully examined during the pressure test.
- E. Before applying the specified test pressure, all air shall be expelled from the pipe. If hydrants, blow-off valves, or air release valves are not available at the high places, the Contractor shall make the necessary taps at points of highest elevation before the test is made and insert plugs after the test has been completed.
- F. Any excessive leakage developing during the test shall be corrected at the Contractor's expense. If the defective portion cannot be located, the Contractor, at his expense, shall remove and reconstruct as much of the original work as necessary to obtain a facility meeting the specified leakage limits.
- G. After all tests on any section have been completed to the satisfaction of the Engineer, the Contractor shall carefully clean, blow out, and drain the line of all water to prevent the freezing of the same. The Contractor shall also demonstrate to the satisfaction of the Engineer that any and all lines are free from obstructions and foreign material.
- H. The Contractor shall bear the complete cost of the tests, including set-up, labor, temporary piping, blocking, gauges, bulkheads, water, air, soap solutions, and any other materials required to conduct the tests.
- I. All pipe used for gaseous chlorine shall be tested with ammonia solution as recommended by the manufacturer of the chlorination equipment.

**TABLE 1**  
**ALLOWABLE LEAKAGE**  
**(U.S. Gallons per 100 Joints per Hour)**

Pipe Diameter (inches)	Test Pressure (psi)			
50	50	100	150	200
4	0.35	0.50	0.60	0.75
6	0.53	0.75	0.90	1.10
8	0.70	1.00	1.20	1.40
10*	0.88	1.25	1.50	1.75
12*	1.05	1.50	1.80	2.10

\*Single-gasket coupling is one joint. Twin-gasket coupling is two joints.

### 3.3 DISINFECTION

After installation and testing, all potable water piping shall be disinfected in accordance with the requirements of the section entitled "Disinfection of Potable Water Lines and Water Storage Tanks" of these Specifications.

### 3.4 FIELD PAINTING

After installation, all exposed piping shall be field primed and painted in accordance with the requirements of the section entitled "Painting" of these Specifications.

END OF SECTION



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## SECTION 15064-B

### PVC SEWER AND SERVICE PIPE

#### PART 1 GENERAL

##### 1.1 SCOPE

The work covered by this section includes furnishing all labor, equipment, and materials required to install and test polyvinyl chloride (PVC) pipe, including accessories, as shown on the Drawings and/or specified herein.

##### 1.2 QUALITY ASSURANCE

- A. The Contractor, at the Engineer's request, shall furnish a certificate from the manufacturer of the pipe and fittings that the manufacturer is fully competent and capable of manufacturing PVC sewer pipe, fittings, and accessories of uniform texture and strength that will fully comply with these Specifications and have so manufactured this class of pipe in sufficient quantities to be certain that it will meet all normal field conditions of usage. The manufacturer must have adequate equipment and quality control facilities to be sure that each extrusion of pipe is uniform in texture, dimensions, and strength.
- B. Pipe shall be tested when requested by the Engineer and all pipe so designated shall be tested in accordance with ASTM D 2412 "Standard Method of Test for External Loading Properties of Plastic Pipe by Parallel Plate Loading."
- C. Each length of pipe and each fitting shall have the following data clearly marked on each piece:
  - 1. Manufacturer's name
  - 2. Pipe size
  - 3. PVC compound used
  - 4. ASTM material specification for the PVC compound used

##### 1.3 SHOP DRAWINGS AND ENGINEERING DATA

Complete shop drawings and engineering data shall be submitted to the Engineer in accordance with the requirements of the section entitled "Submittals" of these Specifications.

##### 1.4 STORAGE AND PROTECTION

- A. PVC piping and accessories shall be stored and protected in accordance with the requirements of the section entitled "Storage and Protection" of these Specifications.
- B. PVC pipe and fittings shall be stored under black plastic cover.
- C. All pipe and accessories shall be stored above ground and fully supported so as not to bend or deflect excessively under its own weight.

## 1.5 GUARANTEE

The Contractor shall provide a guarantee against defective equipment and workmanship in accordance with the requirements of the section entitled "Guarantees and Warranties" of these Specifications.

## PART 2 PRODUCTS

### 2.1 PVC PIPE AND FITTINGS

- A. The pipe and fittings shall be homogeneous throughout and free from visible cracks, holes, foreign inclusions, or other injurious defects. The pipe shall be as uniform as commercially practical in color, opacity, density, and other physical properties.
- B. The manufacturer shall provide waterstops, acceptable to the Engineer, which shall be applied to the outside of the plastic pipe when the pipe is to be enclosed in any structure where concrete or mortar is used which will prevent leakage along the outer wall of the barrel of the pipe.
- C. No single piece of pipe shall be laid on any project covered by this Specification unless it is found to be generally straight. Such pipe shall have a maximum ordinate as measured from the concave side of the pipe not to exceed 1/16-inch per foot of length. If the deviation exceeds this requirement, then the particular piece of pipe shall be rejected from use until it can comply with this provision.
- D. Wyes, tees, bends, adapters, and any other fittings required or directed by the Engineer shall be provided. Engineering data for such fittings showing cross-sectional views with dimensions shall be provided and such data and fittings shall be approved by the Engineer prior to their use. The materials used in the manufacture of fittings shall conform to the requirements for the pipe with which they shall be used and any variation of such requirements shall be subject to the approval of the Engineer. Fittings shall have wall thicknesses equal to or greater than that of the pipe to which they are joined.

### 2.2 PIPE

- A. PVC piping and accessories shall be made from Virgin Type I, Grade 1 PVC compounds with physical and chemical properties conforming to those defined and described in ASTM D 1784 for "Rigid Poly (Vinyl Chloride) Compounds and Chlorinated Poly (Vinyl Chloride) Compounds."
- B. The standard length of PVC pipe under this Specification shall be 20 feet with a minimum of 10 feet, except that all pipe used in service lines shall not exceed 10 feet in length unless otherwise approved by the Engineer.
- C. The 4-inch through 15-inch PVC pipe and accessories shall be manufactured in accordance with ASTM D-3034, Type PSM (SDR 35 or less). The 18-inch through 27-inch PVC pipe and

accessories shall be manufactured in accordance with the requirements of ASTM F-679, polyvinyl chloride (PVC) large diameter plastic gravity sewer pipe and fittings.

## 2.3 JOINTS

- A. PVC pipe joints shall be the bell and spigot type subject to the approval of the Engineer.
- B. The pipe joints shall meet ASTM D-3212, latest revision, for joints for drain and sewer pipe using flexible elastomeric seals, and the seals shall meet standard ASTM F-477. All gaskets shall be factory installed and positively retained by means of a stainless steel, polypropylene or PVC ring. Factory installed glued gaskets will be acceptable; however, field-installed glued gaskets are not acceptable.

## PART 3 EXECUTION

### 3.1 PIPE LAYING

- A. Before sewer pipe is placed in position in the trench, the bottom and sides of the trench shall be carefully prepared and bracing and sheeting installed where required. A mason's line, supported at intervals not exceeding 50 feet, shall be stretched tightly above ground level at a grade parallel to and directly above the axis line of the pipe. Each pipe shall be accurately placed to the exact line and grade called for on the Drawings by measuring down from this line to the invert of the pipe in place. The Contractor shall furnish all labor and materials necessary for erecting batter boards and establishing lines and grades therefor.
- B. The Contractor may use the laser beam method of setting a line and grade for the sewer by using the laser beam coaxially through the center of the sewer being laid. The laser beam projector is to be rigidly mounted to its support platforms, with a two-point suspension, or equivalent, assuring that all ground and equipment vibrations are kept to an absolute minimum. All equipment including equipment necessary to control atmospheric conditions in the pipe to keep line and grade to acceptable standards of accuracy shall be furnished by the Contractor. The laser beam system must be operated by competent experienced men who have been properly trained to operate the equipment used.
- C. The Contractor shall stake check pegs at all manholes throughout the job. Check pegs midway between manholes and any other check points deemed necessary to assure accuracy of the equipment shall be provided by the Contractor.
- D. Each piece of pipe and special fitting shall be carefully inspected before it is placed and no defective pipe shall be laid in the trench. Pipe laying shall proceed upgrade, starting at the lower end of the grade and with the bells uphill. No pipe shall be laid except in the presence of an inspector representing the Engineer. Trench bottoms found to be unsuitable for foundations after pipe laying operations have started shall be corrected and brought to exact line and grade with approved compacted materials.
- E. Bell holes shall be of sufficient size to allow ample room for making the pipe joints properly. Bell holes shall not be cut out more than ten joints ahead of pipe laying. The bottom of the

trench between bell holes shall be carefully graded so that the pipe barrel will rest on a solid foundation for its entire length as shown on the Drawings. Each joint shall be laid so that it will form a close concentric joint with adjoining pipe in order to avoid sudden offsets or inequalities in the flow line.

- F. Water shall not be allowed to run or stand in the trench while pipe laying is in progress or before the joints are completely set or before the trench has been backfilled. The Contractor at no time shall open up more trench than his available pumping facilities are able to dewater. Where sewer pipelines are located in or across stream beds or drainage ditches, the Contractor shall divert the stream flow and dewater each section as the work progresses.
- G. No joints shall be made where pipe or joint materials have been soiled by earth in handling until such soiled surfaces are thoroughly cleaned by wire brushing and wiping until all traces of the earth are removed.
- H. As the work progresses, the interior of all pipe shall be kept thoroughly clean. After each line of pipe has been laid, it shall be carefully inspected and all earth, trash, rags, and other foreign matter removed from the interior. A filled bag or other approved type of follower shall be pulled through the line immediately after each joint is made in order to remove any debris which may be left on the inside of the pipe.
- I. Backfilling of trenches shall be started immediately after the pipe in place has been inspected and approved by the Engineer and backfill shall be deposited and compacted as provided under the section entitled "Earthwork" of these Specifications.
- J. Installation of service pipe shall conform to the appropriate requirements of main line sewers.
- K. Connections of service lines to the main sewer shall be made with bends of the proper degree to make the service run perpendicular to the main sewer. Pipe shall be laid to a uniform line and grade. Minimum grade shall be 1 percent.
- L. The end of all service connections shall be plugged with a PVC plug and sealed with plastic joint material.
- M. Crushed stone bedding and backfill material, concrete encasement and protection, etc., for service line installation shall be provided as conditions require and as directed by the Engineer.
- N. No service connections shall be covered until they have been inspected and located by the Engineer.

### 3.2 INSTALLATION OF TEES, RISERS, AND PLUGGED STUBS

- A. Tee branches shall be installed in the sewer lines at all places shown on the Drawings, specified herein or otherwise directed by the Engineer. Tee branches on pipe less than 12 inches in diameter shall be cast or extruded and manufactured monolithic with the barrel.

- B. Riser connections, of the size and type shown on the Drawings shall be installed at the locations shown on the Drawings or directed by the Engineer. A plastic film marking tape 5 feet long shall be placed 12 inches over the top of each riser during backfilling to mark the location of the riser. The marking tape shall be heavy gauge polyethylene film (.004 inch thick). Tape shall be standard red color imprinted with the words "Warning - Buried Sewer Line Below." Tape shall be Allen Marking Tape No. AMT-1212 as manufactured by the Allen System Inc., Glen Ellyn, Illinois, or equal. A second marking tape containing a metallic core which shall be located with a metal detector shall be laid on top of the first marking tape. This tape shall be 5 feet long and 3 inches wide. Tape shall be Allen Detectotape Catalogue No. ADT-1003 for buried sewer line as manufactured by the Allen System Inc., or equal.
- C. Plugged pipe stubs for future connections to manholes and sewerage structures shall be installed where shown on the Drawings or directed by the Engineer. The pipe stubs shall be installed with the bell encased in the wall of the manhole and the bell opening flush with the outside wall of the manhole or structure.
- D. Plugged stubs and such branches of pipelines that are not to be used immediately shall be closed with PVC stoppers held securely in place.
- E. Where specifically directed by the Engineer or shown on the Drawings, connections to reinforced concrete pipe over 18 inches in diameter shall be made in accordance with details shown on the Drawings.

### 3.3 CONNECTIONS

- A. If the work consists of the construction of a sewer that is to replace an existing sewer, all of the existing service lines shall be kept in operation and connected to the new line.
- B. Connections shall be made to all existing sewer lines in the vicinity of the work by removing a section of the sewer from the existing line and inserting in the space a tee branch of proper size, or by the construction of a manhole, regulator chamber or other structure as shown on the Drawings.
- C. Connections to existing manholes or inlets where no plugged stubs exist shall be made by cutting a hole in the wall of the existing structure, inserting a length of sewer pipe into the hole, filling around same with concrete or mortar and trowelling the inside and outside surfaces of the joint to a neat finish. The bottom of the manhole shall be shaped to fit the invert of the sewer pipe as specified under the section entitled "Manholes" of these Specifications.
- D. Connections to building services shall be made in a neat and workmanlike manner. Cleanout plugs shall be installed, wherever feasible, by making the connections with a standard wye or tee.

### 3.4 EXISTING UTILITIES

- A. All existing sewers, water lines, gas lines, underground conduits, telephone lines, sidewalks, curbs, gutters, pavements, electric lines, or other utilities or structures in the vicinity of the

work shall be carefully protected by the Contractor from damage at all times. Where it is necessary for the proper accomplishment of the work to repair, remove and/or replace any such utility, the work shall be done under the provisions set forth in the "General Conditions." No separate payment shall be made for removing and replacing and/or repairing damaged existing sewers; water, gas, electric, telephone lines or conduits; or other utilities, culverts, drains, or conduits of similar existing services or structures. Similar repair and replacement of sidewalks, curbs, gutters, and pavements are provided elsewhere in these Specifications.

- B. Sewers to be installed parallel to any existing or proposed water main shall be laid at least 10 feet, horizontally, from the water main. If conditions prevent the 10-foot separation, the sewer may be constructed closer to a water main if it is laid in a separate trench and if the bottom of the water main is at least 18 inches above the top of the sewer.
- C. When sewers cross under water mains, the top of the sewer shall be at least 18 inches below the bottom of the water main. If necessary, the water main shall be relocated to provide this separation or reconstructed with mechanical-joint ductile iron pipe for a distance of 10 feet on each side of the sewer. One full length of water main shall be centered over the sewer so that both joints will be as far from the sewer as possible.
- D. When it is impossible to obtain proper horizontal and vertical separation as stipulated above, both water main and sewer shall be constructed of mechanical-joint ductile iron pipe and shall be pressure tested to assure water tightness.
- E. When sewer lines cross under culverts where the sewer and the culvert are less than 18 inches apart, the sewer line shall be encased in concrete as shown on the Standard Drawings.

### 3.5 INSPECTION AND TESTING

- A. After completion of any section of sewer, the grades, joints, and alignment shall be true to line and grade. Joint surfaces shall be smooth. There shall be no visual leakage and the sewer shall be completely free from any cracks and from protruding joint materials, deposits of sand, mortar, or other materials on the inside.
- B. One hundred percent of all PVC pipe 8 inches in diameter and greater shall be deflection tested. The maximum allowable deflection for PVC is 5 percent. After the PVC pipe has been installed and backfilled, the Contractor shall check the deflection by pulling a vertical floating pin type go/no go mandrel sized at 95 percent of the actual inside diameter of the pipe used through the pipe. Deflection tests shall not be conducted before the elapse of 24 hours after backfilling. Any pipe not passing the mandrel shall be replaced and rechecked.
- C. Infiltration shall not exceed 25 gallons per 24 hours per inch of diameter per mile of sewer. Contractor shall furnish all supplies, materials, labor, services, etc., needed to make infiltration or exfiltration tests including water. No separate payment will be made for equipment, supplies, material, water, or services.
- D. Any leakage, including active seepage, shall be corrected by removal and replacement of pipe or joint where such leakage exists until the pipelines meet the requirements of the allowable leakage specifications.

- E. All sewer pipe shall be tested using low pressure air testing in accordance with the procedures and standards listed below.
- F. Clean pipe to be tested by propelling snug-fitting inflated rubber ball through pipe with water.
- G. Plug all pipe outlets with suitable test plugs. Brace each plug securely to prevent blowouts. As a safety precaution, pressurizing equipment shall include a regulator set at slightly above test pressure to avoid overpressurizing and damaging an otherwise acceptable line. No one shall be allowed in the manhole during testing.
  1. Add air slowly to the portion of the pipe installation under test until the internal air pressure is raised to 4.0 psig greater than the average back pressure of any groundwater above the pipe (0.43 psi per foot of groundwater above the pipe invert), but not greater than 9.0 psig.
  2. After an internal pressure of 4.0 psig is obtained, allow at least two minutes for air temperature to stabilize, adding only the amount of air required to maintain pressure
  3. When pressure is decreased to 3.5 psig, start stopwatch. Determine the time in seconds that is required for the internal air pressure to reach 3.0 psig. Minimum permissible holding times for runs of single pipe diameter are indicated in the table in seconds. No separate allowance shall be given for laterals

**Specification Time Required for a 0.5 Psig Pressure Drop  
For Size and Length of Pipe Indicated**

Min. Pipe Diameter (in.)	Min. Time (min.:sec.)	Length for Min. Time (ft.)	Time for Longer Length (sec.)	Specification Time for Length (L) Shown (min:sec)								
				100 Feet	150 feet	200 feet	250 feet	300 feet	350 feet	400 feet	450 feet	
8	3:47	298		3:47	3:47	3:47	3:47	3:48	4:26			
10	4:43	239		4:43	4:43	4:43	4:57	5:56	6:55			
12	5:40	199		5:40	5:40	5:42	7:08	8:33	9:58			
15	7:05	159		7:05	7:05	8:54	11:08	13:21	15:35			
18	8:30	133		8:30	9:37	12:49	16:01	19:14	22:26	25:38		
21	9:55	114		9:55	13:05	17:27	21:49	26:11	30:32	34:54		
24	11:20	99	6.837xL	11:24	17:57	22:48	28:30	34:11	39:53	45:35	51:17	
27	12:45	88	8.653xL	14:25	21:38	28:51	36:04	43:16	50:30	57:42	64:54	
30	14:10	80	10.683xL	17:48	26:43	35:37	44:31	53:25	62:19	71:13	80:07	
33	15:35	72	12.926xL	21:33	32:19	43:56	53:52	64:38	75:24	86:10	96:57	
36	17:00	66	15.384xL	25:39	38:28	51:17	64:06	76:55	89:44	102:34	115:23	

**3.6 CLEANUP**

- A. After completing each section of the sewer line, the Contractor shall remove all debris, construction materials, and equipment from the site of the work, grade and smooth over the surface on both sides of the line and leave the entire right-of-way in a clean and neat condition. Unless otherwise called for on the Drawings, the Contractor shall restore all disturbed areas to as close to its original condition as possible. Restoration shall include but not be limited to grassing, replacing shrubbery, trees, fences and other improvements that have been disturbed.



- B. Cleanup and restoration shall be completed within 60 calendar days after each section of sewer line is installed. Should the Contractor fail to do the cleanup within 60 calendar days, payment made for pipe sewers and service lines for that section of the sewer not cleaned up shall be removed from the periodic estimate until the cleanup work is completed.

END OF SECTION

## SECTION 15090

### PIPE COUPLINGS AND EXPANSION JOINTS

#### PART 1 GENERAL

##### 1.1 SCOPE

The work covered by this section includes furnishing all labor, equipment, and materials required to furnish and install pipe couplings and expansion joints, including grooved couplings, flanged adaptors, expansion couplings, and rubber expansion joints, as shown on the Drawings, specified herein, and/or required for proper installation of piping and equipment.

##### 1.2 SHOP DRAWINGS AND ENGINEERING DATA

Complete shop drawings and engineering data shall be submitted to the Engineer in accordance with the requirements of the section entitled "Submittals" of these Specifications.

##### 1.3 STORAGE AND PROTECTION

Pipe couplings shall be stored and protected in accordance with the requirements of the section entitled "General Equipment Stipulations" of these Specifications.

##### 1.4 SHOP PAINTING

Pipe couplings shall be cleaned, shop primed, and shop painted as specified herein.

##### 1.5 GUARANTEE

Provide a guarantee against defective materials and workmanship in accordance with the requirements of the section entitled "Guarantees and Warranties" of these Specifications.

#### PART 2 PRODUCTS

##### 2.1 EXPANSION COUPLINGS

- A. Unless otherwise shown or specified, expansion couplings shall be of a gasketed, short sleeve type, with a diameter to fit the pipe properly. Expansion couplings shall have a working pressure of not less than 150 PSIG.
- B. Each short sleeve coupling for joining cast iron or ductile iron pipe shall consist of one cylindrical cast iron middle ring without pipe stop, two high-grade malleable iron or steel followers, two rubber compound, wedge section gaskets, and a sufficient number of track head, electroplated steel bolts to compress the gaskets properly. Cast iron couplings shall be Dresser Style 53, Rockwell Style 441, or equal.

- C. Each short sleeve coupling for joining steel pipe shall consist of one cylindrical steel middle ring without pipe stop, two steel follower rings, two rubber-compound, wedge section gaskets, and a sufficient number of track head, electroplated steel bolts to compress the gaskets properly. Steel couplings shall be Dresser Style 38, Rockwell Style 411, or equal.
- D. Where expansion couplings are required for joining cast iron pipe to steel pipe of the same nominal size, steel transition couplings, Dresser Style 62, Rockwell Style 413, or equal, shall be used.
- E. Rubber gaskets shall be composed of a resilient synthetic rubber compound suitable for use in wastewater containing oil and grease.

## 2.2 GROOVED COUPLINGS

- A. Grooved couplings for cast iron and ductile iron pipe shall consist of two or more ductile iron housing clamps, a single rubber compound gasket, and electroplated oval-neck track bolts with heavy hex nuts. Housing shall be ribbed for strength and self-centering. Rubber gasket shall be composed of a resilient synthetic rubber compound suitable for use in wastewater containing oil and grease.
- B. Grooved couplings shall provide for a pipe end separation of not less than 3/32-inch and a deflection of not less than 0°45'.
- C. Grooved couplings shall engage two circumferential grooves cut at the ends of the pipe sections to be joined. The grooves shall provide a positive mechanical grip that locks the pipe ends together such that they cannot blow apart under pressure, vibration, or sag. Grooves shall be cut with a radius at the inside corners of the grooves.
- D. Grooved couplings for joining cast iron or ductile iron pipe shall be Vitraulic Style 31, Gustin-Bacon Gruvajoint No. 500, or equal.

## 2.3 FLANGED ADAPTORS

- A. Flanged adaptors shall be used for joining plain end cast iron or ductile iron pipe to flanged valves, pumps, and fittings. Flanged adaptors shall be suitable for working pressures to 150 PSIG.
- B. Flanged adaptors in sizes 12-inch and smaller shall consist of an ASTM A 126, Class B cast iron flanged body drilled to mate with a 125-pound cast iron flange per ANSI B16.1, a cast iron follower ring, a rubber-compound, wedge section gasket, and a sufficient number of track head, electroplated steel bolts to compress the gasket properly.
- C. Flanged adaptors in sizes 14-inch and larger shall consist of a high strength steel flanged body drilled to mate with a 125-pound cast iron flange per ANSI B16.1, a high strength steel follower ring, a rubber-compound, wedge section gasket, and a sufficient number of electroplated steel bolts to compress the gasket properly.

- D. Rubber gasket shall be composed of a resilient synthetic rubber compound suitable for use in wastewater containing oil and grease.

#### 2.4 FLANGED RUBBER EXPANSION JOINTS

- A. Flanged rubber expansion joints shall be standard spool-type single or multiple arch expansion joints constructed of abrasion resistant rubber reinforced with high tensile strength synthetic fabric and steel rings.
- B. Ends of the expansion joint shall be integral with the body and shall be full faced and drilled per ANSI B16.1 for 125-pound flanges. Beveled and split, galvanized steel retaining rings shall be provided to prevent damage to flanges and to distribute bolting stresses during assembly.
- C. Tube, body, and flanges shall be constructed using Buna-N for wastewater, natural rubber for clean water, and Buna-N or neoprene for air. For working temperatures in excess of 180°F or for chemical service, tube, body, and flanges shall be constructed of Viton. The exterior of the expansion joint shall be coated with Hypalon to resist weathering.
- D. When used to convey slurries, raw water, or untreated wastewater in horizontal piping, arches shall be filled with a special soft rubber compound integrally cured in the arches.
- E. In unrestrained piping systems or pipe systems subject to excessive longitudinal deflection, joints shall be furnished with two plated steel control rods filled with nuts to limit compression and extension and prevent damage to the joint.
- F. Rubber expansion joints shall be "Redflex," as manufactured by Red Valve Company, "Invincible Expansion Joint," as manufactured by Mercer Rubber Company, or equal, subject to the requirements of this section.

#### 2.5 SLIP-ON RUBBER EXPANSION JOINTS

Slip-on rubber expansion joints for low pressure applications (less than 15 PSIG) up through 6-inch-diameter in size shall be sleeve-type, single-arch expansion joints constructed of abrasion resistant rubber reinforced with high tensile strength synthetic fabric.

- A. Ends of the joint shall be designed to slip over pipe ends and shall be secured in place with adjustable stainless steel clamps. Two clamps shall be provided on each end of the joint.
- B. Joint shall be constructed of Buna-N for wastewater and Buna-N or neoprene for air at working temperatures up to 180°F.

## 2.6 SHOP COATINGS

A. Couplings and adaptors shall have finish as follows:

<b>Material</b>	<b>Location</b>	<b>Primer</b>	<b>Finish</b>
Cast Iron	Buried or Submerged	Asphaltic Varnish Inside and Out	
Cast Iron	Exposed	Asphaltic Varnish (Interior)	
Cast Iron	Exposed	Primer (Exterior)	(Field Applied)
Steel	Buried or Submerged	Epoxy Primer Inside and Out	Coal Tar Epoxy
Steel	Exposed	Primer (Exterior)	(Field Applied)
Steel	Exposed	Epoxy Primer (Interior)	Coal Tar Epoxy (Interior)

B. Coatings used for couplings and adaptors in potable water shall be approved for use with potable water.

## 2.7 SPARE PARTS

The Contractor shall furnish two spare gasket sets and two spare track head bolt sets for each size and type of coupling.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Pipe couplings and expansion joints shall be installed where shown on the Drawings, required, or directed by the Engineer. Couplings and joints shall be installed in strict conformance with the manufacturer's instructions.
- B. Pipe ends shall be cleaned, brushed, or filed to produce a mating surface for the gasket that is free from dirt, rust, chuck marks, mill scores, dents, burrs or other foreign substances that would impede proper gasket seating.
- C. Grooves for grooved couplings shall be accurately located and cut with a suitable grooving tool.
- D. A lubricant recommended by the coupling manufacturer shall be used in seating all gaskets.
- E. On expansion couplings and flanged adaptors, bolts shall be tightened diametrically opposite each other and in progression so that the inner rims project an equal distance over the flares of the middle ring at all points. Bolts shall be tightened sufficiently to ensure a watertight joint but shall not be tightened beyond the point of stretching.

- F. On grooved couplings, bolts shall be tightened alternately and uniformly so the housing clamps come together evenly and the gasket is not pinched. Bolts shall be tightened until the housing clamps meet.
- G. Following installation and testing, couplings shall be field painted in accordance with the requirements of the section entitled "Painting" of these Specifications. Rubber expansion joints shall not be painted.

END OF SECTION

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## SECTION 15101

### VALVES

#### PART 1 GENERAL

##### 1.1 SCOPE

- A. The work covered by this section includes furnishing all labor, equipment, and materials required to furnish and install all metal valves, including operators, boxes, and accessories, as specified herein, shown on the Drawings, or required for proper completion of the work under these Contract Documents.
- B. The Contractor's attention is called to the fact that all valves, especially in the smaller sizes, are not necessarily shown completely on the Drawings, which are more or less schematic. However, the Contractor shall furnish and install all valves indicated or required for proper operation of the equipment or services requiring such valves.
- C. Modulating electric motor-operated and pneumatic cylinder-operated control valves shall be furnished under the section entitled "Instrumentation and Controls" of these Specifications.
- D. Polyvinyl chloride (PVC) valves shall be furnished under the section entitled "Polyvinyl Chloride Pressure Pipe" of these Specifications.

##### 1.2 SHOP DRAWINGS AND ENGINEERING DATA

Complete shop drawings and engineering data shall be submitted to the Engineer in accordance with the requirements of the section entitled "Submittals" of these Specifications.

##### 1.3 STORAGE AND PROTECTION

- A. Valves and accessories shall be stored and protected in accordance with the requirements of the section entitled "General Equipment Stipulations" of these Specifications.
- B. Valves shall be completely drained prior to shipment. Ends of flanged and mechanical joint valves shall be protected with full size wooden baffles securely bolted to the valve ends. Size of baffles shall be at least equal to outside diameter of flange. Valves 24 inches in size and larger shall be secured to a wooden skid to facilitate handling and storage.

##### 1.4 SHOP PAINTING

- A. Valves and accessories shall be cleaned, shop primed, and shop painted in accordance with the requirements of the section entitled "General Equipment Stipulations" of these Specifications, or as specified herein.
- B. Unless otherwise specified, all interior and exterior non-machined, nonbearing ferrous surfaces on iron body valves, gates, and accessories shall be blast-cleaned and painted at the factory with two coats of asphaltic varnish conforming to Federal Specification TT-V-51c.



Exterior non-machined, nonbearing ferrous surfaces on valve operators and on non-submerged or non-buried butterfly and eccentric plug valves shall be blast-cleaned and painted at the factory with one coat of zinc chromate primer conforming to Federal Specification TT-P-645 and one coat of compatible alkyd enamel. Other paint systems may be proposed by the valve supplier, subject to the Engineer's approval.

#### 1.5 OPERATION AND MAINTENANCE DATA

Submit complete operation and maintenance data on the valves in accordance with the requirements of the section entitled "Operation and Maintenance Data" of these Specifications.

#### 1.6 QUALITY ASSURANCE

The valve manufacturers shall furnish a written certification to the Engineer that all valves and operators furnished comply with all applicable requirements of the governing AWWA standards specified herein.

#### 1.7 GUARANTEE

Provide a guarantee against defective equipment and workmanship in accordance with the requirements of the section entitled "Guarantees and Warranties" of these Specifications.

### PART 2 PRODUCTS

#### 2.1 GENERAL

- A. All castings, regardless of material, shall be free from surface defects, swells, lumps, blisters, sandholes, or other imperfections.
- B. All valves shall have the name of the manufacturer, rated working pressure, and size of the valve cast upon the body or bonnet in raised letters. Alternately, the name of the valve manufacturer, rated working pressure, and size may be stamped on a stainless steel identification plate permanently attached to the valve body or bonnet. Valves specified to conform with AWWA requirements shall have the letters "AWWA" cast upon the valve body or bonnet in raised letters.
- C. Valves and operating mechanisms shall be of the proper size and dimensions to fit the pipe connections thereto and shall be installed in the position and within the space shown on the Drawings.
- D. Unless otherwise specified, the direction of rotation of the operator to open the valve shall be to the left (counterclockwise). Each valve body or operator shall have cast thereon the word OPEN and an arrow indicating the direction to open.
- E. A union or coupling shall be provided within 2 feet on each side of a threaded end valve unless the valve can be otherwise easily removed from the piping. This shall not apply to soldered end valves in copper plumbing.

- F. All exposed bolts and nuts on buried or submerged valves and operators shall be brass or stainless steel for corrosion resistance. Exposed bolts and nuts on exposed valves and operators shall be of corrosion-resistant materials or shall be zinc or cadmium plated.
- G. Valves and operators, whether manual or powered, shall be provided as a single, coordinated unit by at single supplier.
- H. Valve operators shall be of sufficient size and capacity to seat, unseat, and operate the valve under the maximum specified differential pressure. Where no maximum differential pressure is specified, the operator shall be designed for a differential pressure equal to the maximum working pressure of the valve. Additional allowances shall be made for the lubricating and/or scale forming tendencies of the fluid.

## 2.2 GATE VALVES

- A. Unless otherwise specified, all gate valves 3 inches in size and smaller and those larger than 12-inches shall be of the single disc, double-sealed, solid tapered wedge type; gate valves in sizes 4 through 12 inches shall be of the single disc, resilient seated type. Valves shall have non-rising stems and shall be capable of being repacked under pressure when valve is fully open. Iron body gate valves for potable water lines larger than 12-inches shall be of the double disc type.
- B. Gate valves 2<sup>1</sup>/<sub>2</sub> inches in size and smaller installed above grade shall be bronze body, bronze-fitted valves, and shall have 150-pound, cast bronze body, union bonnet, Teflon-impregnated asbestos packing, and threaded ends per ANSI B2.1. Bronze shall conform to ASTM B 62. Brass for nuts and gland shall conform to ASTM V 16. Valve discs shall be reversible. Bronze gate valves shall be Stockham Fig. B-130, Nibco Fig. T-136, or equal. For use in copper plumbing, gate valves shall be furnished with solder ends per ANSI B16.18. Gate valves 2<sup>1</sup>/<sub>2</sub> inches in size and smaller installed below ground shall be cast iron body, bronze mounted type with 2-inch square operating nut equal to the type specified in paragraph C below.
- C. Gate valves 3 inches in size and those larger than 12 inches in water and wastewater shall be iron body, bronze mounted valves conforming in all respects to the applicable material and dimensional requirements of AWWA C500. Minimum working pressures shall be 200 psi for valves from 3 to 14 inches in size and 150 psi for valves 16 inches and larger. Gate valves shall have an O-ring or self-adjusting chevron packing stem seal, and 125-pound, flanged ends per ANSI B16.1, except for valves to be buried underground, which shall have mechanical joint ends per ANSI A21.11 (AWWA C111). Body seat rings shall be ASTM B 62 bronze and shall be screwed into the body so as to be field replaceable. Disc faces and all moving parts shall be bronze or bronze mounted. Cast iron for body and bonnet shall conform to ASTM A 126, Grade B. Iron body gate valves with solid wedge discs shall be M & H (Dresser) Fig. 2067, Transverse City Fig. A248, or equal. Iron body gate valves with double discs shall be M & H (Dresser) Fig. 67, Mueller Fig. A-2380, or equal.
- D. Gate valves in sizes 4 through 12 inches for use in water and wastewater shall be of the iron body resilient seated type, manufactured in conformance with AWWA C509. Gate shall be of cast iron with bonded resilient seat and integral flush drain. Minimum working pressures shall be 200 psi when unbalanced pressure is applied to either side of the gate. Gate valves shall

have a minimum of two O-ring stem seals; one above and one below the integral stem collar. The area between the O-rings shall be filled with permanent lubricant. Valve shall have no metal fasteners or screws exposed in the wetted portion of the valve. All ferrous surfaces shall be shot blasted to a white metal finish. All interior and exterior valve surfaces, including the interior of the gate and all bolt holes shall be coated with an epoxy coating in accordance with AWWA C550. The minimum thickness of the coating shall be 8 mils. Valve ends shall be of the type required for the installation as specified herein or shown on the Drawings and shall meet the requirements as specified in the above paragraph C of this section. Resilient seated gate valves shall be Kennedy Ken-Seal, American Darling CRS-80 or equal.

- E. Gate valves 3 inches in size and larger in steam service shall have 125-pound cast iron body, bronze trim, and outside stem and yoke.
- F. Gate valves shall be furnished with nut, wrench, chain, or handwheel operators as shown on the Drawings. Unless otherwise shown or specified, valves shall have operators as specified in Part 2.19 of this section. Extension stems, floorstands, and valve boxes and covers shall be furnished where shown or required.

### 2.3 KNIFE GATE VALVES

- A. Knife gate valves shall be of the flanged wafer type with outside stem and yoke and a metal-seated, knife-blade gate with a beveled edge designed to push aside or cut through solids in its path. Knife gate valve shall have full round port opening and shall have a working pressure of at least 125 psi in sizes 24 inches and smaller and 50 psi in sizes 30 inches and larger.
- B. Knife gate valves shall have a heavy, one-piece body and end flanges of steel or cast iron. Valves shall be lined throughout with stainless steel, including the chest and packing areas. Liner shall extend beyond flange to form raised face mating surface. Knife gate shall be of ground and polished stainless steel of sufficient thickness to resist deformation of rated pressure across the gate. A full circle, raised-face seat with machined gate jambs at the sides and bottom shall be provided to hold the gate and assure positive seating. All wetted parts of the valve shall be of Type 304 stainless steel.
- C. Knife gate shall be sealed with a minimum of four rings of Teflon or neoprene-impregnated asbestos packing. Gland shall be of corrosion-resistant material or shall be specially coated for corrosion resistance. Gland bolts and nuts shall be stainless steel.
- D. A heavy, fabricated, angular steel yoke assembly with stainless steel rising stem and bronze yoke sleeve shall be provided on the valve. Valve shall be provided with handwheel operator or extension stem and floorstand as shown on the Drawings. Valves 24 inches and larger shall have a geared operator.
- E. Ends of the valve shall be flanged and shall be drilled to mate with 125-pound cast iron flanges per ANSI B16.1.
- F. Knife gate valves shall be Dezurik "Series L," Fabri-Valve "Figure 22," or equal.

## 2.4 GLOBE AND ANGLE VALVES

- A. Unless otherwise shown or specified, globe valves with straight-through pattern globe bodies shall be furnished. The direction shall be "flow opening." Globe and angle valve stems, seats, and seat rings shall be accessible and replaceable without removing the valve from the piping system. Valves shall be capable of being repacked under pressure when the valve is fully open.
- B. Valves sized 2<sup>1</sup>/<sub>2</sub>-inches and smaller shall be bronze-body and bronze mounted. Valves shall have 150-pound, cast bronze body, union bonnet, Teflon-impregnated asbestos packing, and threaded ends per ANSI B2.1. Bronze for body and bonnet shall conform to ASTM B 62. Valves for shutoff applications shall have a renewable disc, Buna-N for water or gas, Teflon for steam. Valves for throttling applications shall have a stainless steel plug-type disc hardened to at least 350 Brinnell and renewable stainless steel seat ring. Bronze globe valves shall be Stockham Fig. B-22 or B-29, Jenkins Fig. 106 or 546, Nibco Fig. T-235, or equal. Bronze angle valves shall be Stockham Fig. B-222 or B-229, Nibco Fig. 335, or equal. Valves used in copper plumbing shall have solder ends per ANSI B16.18.
- C. Valves sized 3 inches and larger shall be iron body, bronze mounted valves. Valves shall have 125-pound, cast iron body, bolted bonnet, outside stem and yoke, Teflon-impregnated asbestos packing, and 125-pound, flanged ends per ANSI B16.1. Cast iron for body and bonnet shall conform to ASTM A 126, Grade B. Bronze for trim shall conform to ASTM B 62. Valves for shutoff applications shall have renewable disc, Buna-N for water or gas, Teflon for steam. Valves for throttling applications shall have bronze disc and renewable bronze seat ring. Packing gland bolts shall be bronze with brass nuts.
- D. Valves shall be furnished with operating nut, wrench, or handwheel operator as shown on the Drawings. Unless otherwise shown or specified, valves shall be furnished with operators as specified in Part 2.24 of this section.
- E. Where used as a stop and waste valve, globe valve shall be furnished with a 1/8-inch drain cap on downstream portion of body.

## 2.5 BUTTERFLY VALVES

- A. Unless otherwise shown or specified, butterfly valves shall be of the resilient seated, tight-closing type and shall conform in all respects to the applicable material and dimensional requirements of AWWA C504. Wafer-type butterfly valves in sizes 24 inches and larger shall conform to all general requirements of AWWA C504 except laying length. Butterfly valves shall operate from fully open to fully closed with a 90-degree rotation of the valve stem.
- B. Valves shall be designed for the working pressures and/or pressure class designations shown on the Drawings or specified in these Specifications. If a working pressure or pressure rating is not given, the following requirements shall apply:

Service	AWWA Pressure Rating
Low Pressure Air	25B
Wastewater or Sludge	150B
Potable or Plant Water	150B

Wafer type valves shall have a pressure rating of not less than 150 psi. Valves shall be drip-tight and bubble-tight at rated pressure differential across the valve in both directions.

- C. Valve body shall be one-piece, constructed of cast iron conforming to ASTM A 126, Class B. The diameter of the opening shall be not less than the diameter of the corresponding pipe size. Unless otherwise specified, valve body shall be of the short-body style in accordance with Table 2 of AWWA C504. This requirement shall not apply to wafer type valves. No part of the valve internals shall extend beyond the valve ends when the valve is in the closed position. Short-body valves shall have 125-pound flanged ends per ANSI B16.1. Wafer type valves shall be designed to fit between 125-pound flanges per ANSI B16.1.
- D. Disc shall be cast bronze conforming to ASTM B 143, Alloy 1A, cast iron conforming to ASTM A 48, Class 40, Ni-resist cast iron conforming to ASTM A 436, Type 1 or 2, or Ni-resist ductile iron conforming to ASTM A 439, Type D2. When used in wastewater or raw water, disc shall be streamlined with no exterior ribbing or openings.
- E. Shafts shall be polished stainless steel conforming to ASTM A 276, Type 304 or Type 316. All keys and pins used in securing valve disc to shafts shall be stainless steel or monel.
- F. Valve seat shall be of one-piece, molded synthetic rubber, Buna-N (Hycar) for wastewater and Buna-N or neoprene for air. Where temperatures exceed 180EF, EPT or Viton seats shall be used. Retaining rings, if used, shall be stainless steel. The method of mounting valve seat shall conform to the applicable requirements of AWWA C504, Section 8. Valve seats in sizes 24 inches and larger shall be field replaceable without necessity of chipping, burning, or cutting. Seats secured with retaining rings shall be fully adjustable. Metal seat mating surfaces shall be smoothly contoured and polished 18-8 stainless steel or monel. Alloy cast iron will not be acceptable as a seat mating surface. Sprayed or plated seat mating surfaces will not be acceptable.
- G. Shaft seals shall be O-ring or self-adjusting chevron packing of Buna-N or neoprene. Shaft seals shall conform to the requirements of AWWA C504, Section 10, and shall be of a design that allows replacement of the seal without removing the valve shaft. Alternately, pull-down packing is acceptable if the packing is adjustable and replaceable without removing valve operator.
- H. Valve bearings shall be self-lubricating, sleeve-type bearings of corrosion resistant materials. Bearing load shall not exceed 2,500 psi. Valves 24-inches in size and larger shall be provided with an adjustable, two-way thrust bearing to center the disc in the valve and allow the valve to be installed with the valve stem vertical. Bearing shall be easily accessible for adjustment.
- I. Where the valve is installed adjacent to a fitting, flow meter, another valve, or similar items, a spool piece or adaptor coupling shall be furnished as a spacer so that valve disc does not

interfere with the operation of the adjacent meter or valve or contact cement linings on pipe or fittings.

- J. Valve shall be furnished with a lever operator, rotary manual operator, electric motor operator, or pneumatic cylinder operator as shown on the Drawings. Unless otherwise shown or specified, a lever operator shall be furnished on valves 6 inches and smaller, and a rotary manual operator shall be furnished on valves 8 inches and larger. Extension stem and floorstand shall be furnished, where shown or required.
- K. Butterfly valves shall be as manufactured by BIF, Pratt, or equal.

## 2.6 TWO-WAY PLUG VALVES

- A. Unless otherwise shown or specified, two-way plug valves shall be of the eccentric, non-lubricated type with resilient, neoprene-faced or epoxy-coated plugs providing drip-tight shut-off at rated pressure. Port area shall not be less than 80 percent of the corresponding full pipe area in sizes 12-inches and smaller and 100 percent of the corresponding full pipe area in valves 14 inches and larger. Two-way valves shall operate from fully open to fully closed with a 90-degree rotation of the valve stem. Plug valves shall meet or exceed the latest revision of AWWA Standard C517.
- B. Valves shall be designed for a working pressure of not less than 175 psi in sizes through 16 inches and 150 psi in sizes 18 inches and larger. Valves shall be drip-tight at rated pressure differential in both directions.
- C. Valves shall have bodies of ASTM A 126, Grade B or ASTM A 48, Grade 40 cast iron. Valves 4 inches and larger in size shall have bolted bonnet.
- D. Body seats for resilient-faced plugs shall be welded in and shall contain a minimum of 90 percent nickel. Welded-in seats shall conform to the applicable requirements of AWWA C507, Section 7.2 and AWWA C504, Section 9.4.
- E. Plugs without a resilient coating or facing shall be epoxy coated and shall have a field replaceable, full-circle rubber seat securely attached to the plug. Body seats shall be nylon coated.
- F. Shaft seal shall be of the self-adjusting or split-V type of Buna-N and shall comply with the applicable requirements of AWWA C504, Section 11 and AWWA C507, Section 10. Seals requiring adjustment shall be adjustable and replaceable without bonnet or shaft removal.
- G. Bearings shall be supplied in both the upper and lower journals. Bearings shall be permanently lubricated and replaceable with stainless steel, bronze, or specially coated corrosion-resistant sleeves and bushings. Bearings shall conform to the applicable requirements of AWWA C504, Section 9 and AWWA C507, Section 8.
- H. Valves sized 2<sup>1</sup>/<sub>2</sub> inches and smaller shall have threaded ends per ANSI B2.1. End connections for valves sized 3 inches and larger shall be 125-pound flanged per ANSI B16.1, except for valves to be buried underground, which shall have mechanical joint ends per ANSI A21.11

(AWWA C111). Flanged end valves in sizes 12 inches and smaller shall have a laying length equal to that of an AWWA gate valve of the same size.

- I. Valves intended for buried or submerged service shall be sealed against the entrance of water and dirt.
- J. Valves shall be furnished with a lever operator, rotary manual operator, or electric motor operator as shown on the Drawings. Unless otherwise shown or specified, a lever operator shall be furnished on valves 6 inches and smaller, and a rotary manual operator with handwheel shall be furnished on valves 8 inches and larger. Extension stem, floorstand, and valve box shall be furnished where shown or required.
- K. Two-way plug valves shall be DeZurik "Series 100 Eccentric Plug Valve," Dresser "X-Centric," or equal.

## 2.7 THREE-WAY PLUG VALVES

- A. Three-way plug valves shall be of the nonlubricated, tapered plug type. Manual valves for drip-tight shutoff shall have resilient, neoprene-faced plugs. Electric motor operated and pneumatic cylinder operated valves and manual valves for flow diverting service where drip-tight shutoff is not required shall be metal-to-metal seated or hard rubber lined. Plug shall be designed to shut off one port at a time and shall be capable of 360-degree rotation.
- B. Valves shall be suitable for working pressures to 125 psig. Operators shall be capable of operating the valve against a pressure differential of not less than 35 psig.
- C. Valve body shall be constructed of cast iron conforming to ASTM A 126, Class B. Valve shall have upper and lower stainless steel sleeve bearings and Buna-N or Teflon stem packing. Stem packing shall be adjustable and replaceable without valve disassembly or removal of operator. Valve shall have 125-pound flanged ends per ANSI B16.1.
- D. Valves in drip-tight service shall have resilient-faced plugs with lift, turn, and reseal action. Valve shall be furnished with a single lift, turn, and reseal lever or double handwheel, rotary manual operator. Handwheel operator shall have one handwheel to lift and reseal the plug and one handwheel to turn the plug. Drip-tight shutoff shall be provided throughout the lift, turn, and reseal action.
- E. Valves in flow-diverting service shall have metal-to-metal seats or hard rubber lining on all interior wetted surfaces. Plug shall be constructed of Ni-Resist cast iron or other material of equivalent corrosion resistance and strength. A device shall be provided to permit easy adjustment of the plug-to-seat clearance without valve disassembly. Manually operated valves shall have lever operator or single handwheel, rotary manual operator. Where shown or specified, valve shall be furnished with an electric motor operator or pneumatic cylinder operator.

## 2.8 BALL VALVES

- A. Ball valves shall be of the quarter turn type with full pipe size opening through the valve. Ball valves shall be suitable for a differential working pressure in either direction of not less than 400 psi.
- B. Ball valves shall have a three-piece, bolted body designed to allow the interior portion of the valve to be removed without disturbing adjacent piping.
- C. Unless otherwise specified or required, ball valves shall have brass body, self-aligning brass ball, blowout-proof brass stem, reinforced Teflon seats and seals, plastic-coated plated steel handle, and threaded ends per ANSI B2.1. Ball valves shall be Powell "Star," Worcester "Miser," or equal.
- D. Ball valves shall be available with Type 316 stainless steel construction where shown or specified.

## 2.9 CHECK VALVES

- A. Unless otherwise shown or specified, check valves shall be of the swing type suitable for use in either horizontal or vertical piping. Disc shall swing entirely clear of the path of flow when in the open position. All internal parts shall be readily accessible and easily replaced in the field.
- B. Check valves in sizes 2<sup>1</sup>/<sub>2</sub> inches and smaller shall be Y-pattern, regrinding, bronze-body, bronze-mounted valves. Valves shall have 200-pound, cast bronze body, renewable bronze disc, screwed cap, and threaded ends per ANSI B2.1. Bronze for body and cap shall conform to ASTM B 61. Brass nuts and pin shall conform to ASTM B 16. Valves shall have a hinge bumper capable of preventing the valve from sticking in the open position and an arrow cast on the valve body to indicate direction of flow. Bronze check valves shall be Powell Fig. 560Y, Stockham Fig. B-345, Nibco Fig. T-453-B, or equal.
- C. Check valves in sizes 3 inches and larger shall be iron body, bronze-mounted valves conforming to AWWA C508. Valves shall have 125-pound cast iron body, bolted and gasketed cover, stainless steel or brass hinge pin, renewable bronze seats and disc, outside lever and adjustable weight, and 125-pound flanged ends per ANSI B16.1. Cast iron for body and cap shall conform to ASTM A 126, Grade B. Bronze for disc and seats shall conform to ASTM B 62. Iron body check valves shall be Mueller Fig. 2600-6-01, M & H (Dresser) Fig. 50, Nibco Fig. F-918-BL&W, or equal.
- D. Valves shall be installed with pressure under the disc.
- E. Check valves in air or gas piping sized 2<sup>1</sup>/<sub>2</sub> inches or smaller shall be bronze, swing type check valves conforming to the requirements of Item B above, except that the disc shall have a replaceable, resilient seat of Buna-N or Teflon. Bronze check valves for air or gas service shall be Nibco Fig. T-453-W, Kennedy Fig. 442, or equal.



- F. Check valves in air or gas piping sized 3 inches and larger shall be of the double-plate, spring-loaded, clapper type with cast iron body, aluminum bronze or bronze plates, stainless steel hinge pin and springs, and Buna-N seats. When operating temperatures exceed 180°F, Viton seats shall be used. Check valves shall be wafer style bodies suitable for mounting between two 125-pound ANSI B16.1 flanges. Check valves shall be rated for a working pressure of not less than 150 psi. Clapper style check valves shall be Mission “Duo-Check,” FMC, or equal. Clapper style check valves in horizontal piping shall be installed with the pin in a vertical position.

## 2.10 SOLENOID VALVES

- A. Two-way solenoid valves shall be of the packless type with full-area ports. Four-way solenoid valves shall be of the two-position, poppet type and shall feature tight seating discs with zero leakage.
- B. Valve body shall be forged brass or stainless steel with resilient seat of Viton, Buna-N, or Teflon. Coils shall be molded, continuous-duty coils with epoxy-encapsulated, Class F insulation.
- C. Solenoid valves shall be furnished with a NEMA-4 solenoid chamber enclosure and shall be designed for operation on 120-volt, 60 hertz, single-phase power. Unless otherwise shown or required, two-way valves shall be normally closed (when de-energized). Conduit connection box shall be integral with solenoid chamber. Valves shall be UL listed and CSA approved.
- D. Solenoid valves shall be wired into the pump motor control circuit so that the valves are open (energized) whenever the pump motor is running. Solenoid valves shall not require differential pressure for operation.
- E. Solenoid valves shall be as manufactured by Automatic Switch Company, Skinner, or equal.

## 2.11 HOSE BIBBS

Hose bibbs shall be angle hose valves of bronze construction suitable for 200 psi minimum working pressure. Valves shall have a renewable Teflon or resilient disc and shall be furnished with a  $\frac{3}{4}$ -inch male hose outlet connection. Body and bonnet shall be ASTM B 62 bronze. Valves shall be furnished with a suitable cap and chain. Inlet connection shall be threaded per ANSI B2.1.

## 2.12 HOSE VALVES

Hose valves shall be wedge disc, rising stem gate valves of bronze construction suitable for 200 psi minimum working pressure. Valves shall have a male outlet hose connection and a threaded inlet connection per ANSI B2.1. Valves shall be furnished with a suitable cap and chain. Body and bonnet shall be ASTM B 62 bronze.

## 2.13 SILLCOCKS

Sillcocks shall be of the frost-proof type with bronze construction, sill flange, extended body, and renewable resilient disc. Sillcock shall have a  $\frac{3}{4}$ -inch male hose outlet connection.

## 2.14 PRESSURE REDUCING VALVES FOR WATER

- A. Pressure reducing valves shall automatically reduce a higher inlet pressure to a preset, steady outlet pressure. The reducing valve shall be very sensitive to slight pressure changes and immediately control the main valve to maintain the desired pressure. Valve outlet pressure shall be adjustable between 25 and 75 psi.
- B. The main valve shall be direct acting, single-seated, spring-loaded, diaphragm-actuated, globe type valve. When the downstream pressure exceeds the pressure setting, the main valve shall close drip-tight. Piston actuators will not be acceptable. Main valve shall be guided at two locations. No external packing glands shall be used and the diaphragm shall not be used as a seating surface.
- C. Pressure reducing valves sized 2 inches and smaller shall have cast bronze body, stainless steel seat ring, Teflon, Buna-N, or composition disc and diaphragm, and outside screw adjustment. Valves shall be suitable for 230 psi inlet pressure. Valves shall be furnished with threaded ends per ANSI B2.1. Bronze pressure reducing valves shall be Mueller Fig. H-9300, Watts Regulator No. 223S, or equal.
- D. Pressure reducing valves 2½ inches and larger shall have cast iron body, bronze trim, bolted cover, and pilot-controlled main valve. The pilot control system shall be external, connected to the valve with union fittings. Pressure setting shall be adjustable by a single screw adjustment enclosed in a tamperproof housing. Valve shall be suitable for an inlet pressure of not less than 175 psi. Valves sized 2½ inches shall have threaded ends per ANSI B2.1. Valves 3 inches and larger shall have 125-pound, flanged ends per ANSI B16.1. Valve body and cover shall be of cast iron conforming to ASTM A 48. Valve trim and pilot control shall be of ASTM B 61 or B 62 bronze. Pilot control trim shall be stainless steel. Valve shall be supplied with an integral strainer, constructed of heavy and fine mesh monel screens, to protect the pilot control system from foreign particles. Pilot controlled valves shall be Clayton Fig. 90G-01, Golden Anderson Fig. 45-D, or equal.
- E. A separate Y-pattern strainer with threaded or bolted cleanout shall be furnished and installed immediately upstream of each pressure reducing valve. Area through the screen shall be not less than four times the full pipe area. Strainers shall have a pressure rating not less than that of the protected pressure regulating valve.
- F. A 2-inch pressure gauge with tee-head, bronze gauge cock shall be installed on the upstream and downstream side of each pressure regulating valve unit. Pressure gauges on the upstream side shall have a range of approximately 0 to 160 psi. Pressure gauges on the downstream side shall have a range of approximately 0 to 80 psi.

## 2.15 GAUGE COCKS AND PET COCKS

- A. Gauge cocks shall be of all bronze construction with threaded female ends and tee handle.
- B. Pet cocks shall be of all bronze construction with threaded male end and lever handle. Pet cocks shall be of ¼-inch minimum size.

## 2.16 NEEDLE VALVES

Needle valves shall be of all bronze construction and shall have a seat opening of not less than 1/4-inch. Valves shall be furnished with 200-pound bronze body, bronze stem, Teflon-impregnated asbestos packing, and threaded ends per ANSI B2.1. Bronze for body shall conform to ASTM B 61. Needle valves shall be Stockham Fig. B-64, Jenkins Fig. 741-G, or equal.

## 2.17 CURB STOPS AND CORPORATION STOPS

- A. Curb stops shall be of all bronze construction with straight-through unobstructed pattern flow, Teflon coated plug, top and bottom O-ring plug seals, O-ring port seals, and solid tee handle. Valves shall be suitable for 175 psi minimum working pressure. A quarter turn shall operate the valve from fully open to fully closed position. Valves shall comply with the applicable requirements of AWWA C800.
- B. Curb stops shall be furnished with cast iron foot pieces to permit the curb box to rest on a solid surface without bearing on the curb stop or piping.
- C. Curb boxes shall be of cast iron, shall have a 2-inch inside diameter, and shall be of the extension type with lid and plug. One compatible steel shut-off rod of suitable length shall be furnished. Curb boxes and bases shall be coated with a suitable bituminous coating.
- D. Corporation stops for service line connections shall be precision fitted, individually lapped, ground joint key stops of all bronze construction. For tapped connections to water mains, inlet threads shall be of the steep taper, corporation stop type. Corporation stops shall conform to the applicable requirements of AWWA C800.

## 2.18 MUD VALVES

- A. Mud valves shall have cast iron, bronze fitted construction with heavy-duty yoke and nonrotating disc. Seating surfaces, stem, and lift nut shall be bronze. Mud valves shall have non-rising stem and flanged base frame drilled to mate with a 125-pound cast iron flange per ANSI B16.1.
- B. Mud valves shall be furnished with an Acme-threaded brass or stainless steel extension stem and a floorstand operator with handwheel.
- C. Mud valves shall be Mueller "A-25600," M&H (Dresser) "Fig. 40," Clow "F-3075," or equal.

## 2.19 FLAP VALVES

- A. Flap valves shall be designed to withstand the stresses resulting from high-head seating applications and to maintain sensitivity to unseating heads.
- B. Flap valves shall have iron bodies and shall be bronze mounted. Valves shall be furnished with bronze hinge pins, flap rings, and seat rings.
- C. Valves shall be furnished with 125-pound flanged ends per ANSI B16.1.

- D. Flap valves shall be Clow F-3012, Mueller A-2540-6, M&H (Dresser) Figure 47, or equal.

## 2.20 PRESSURE RELIEF VALVES

- A. Pressure relief valves shall be installed as shown on the Drawings. Length of valve shall be suitable for the thickness of slab or wall.
- B. Floor type valves shall have an inside diameter of 4 inches and shall be cast iron, bronze mounted, with bottom strainer and nonseparating, removable cover. Floor type valves shall be Clow "F-1492," Rodney Hunt, American Darling, or equal.
- C. Wall type valves shall have a 4-inch flanged connection suitable for connection to a 4-inch flanged wall pipe. Valves shall have iron bodies and shall be bronze mounted. The valve manufacturer shall supply the wall pipe and end strainer for complete installation of each valve. The valve shall be furnished with resilient seats of neoprene or Buna-N. Maximum flap opening angle shall not exceed 80 degrees. Wall type valves shall be Clow "F-1494", Rodney Hunt "FV-AC", or equal.
- D. Wall type valves shall be installed so that the bolt holes straddle the centerline. The strainer plug shall be caulked into the wall pipe with lead wool.

## 2.21 SHEAR GATES

- A. Shear gates shall be of the iron body, bronze mounted, double wedge type and shall be furnished with lift rod complete with handle and catch. Length of lift rod shall be as shown on the Drawings or as required.
- B. Shear gates shall be furnished with 125-pound flanged ends per ANSI B16.1.
- C. Shear gates shall be Clow "F-3000," M&H "Figure 44," or equal.

## 2.22 AIR RELEASE VALVES

- A. Air release valves shall have cast iron body, stainless steel float, and stainless steel or bronze trim.
- B. Valve shall be designed for a working pressure adequate to accommodate the line pressure on which the valve will be installed and shall be equipped with an orifice appropriate to the venting needs of the pipeline.
- C. Sewage valves shall be equipped with an elongated body, a 2-inch NPT inlet connection, and a 1/2-inch NPT outlet connection and shall be provided with 2-inch inlet shut-off valve, 1-inch blow-off valve, and 1/2-inch back-flush valve with quick-disconnect coupling and flushing hose with quick-disconnect connections.
- D. Sewage valves shall be Valve and Primer "APCO 400," Multiplex "Crispin," Val-Matic "Sewage Air Release Valve," or equal.

- E. Water air release valves shall be provided with a bronze shut-off valve, and shall be "Apco" or approved equal.
- F. Combination air vacuum/air release valves shall be installed complete with gate valve at locations shown on the Drawings. Valves 2 inches and smaller shall have NPT screwed inlet. Combination air vacuum/air release valves shall be Valve and Prime Corp., APCO Combination Air Release Valve (Standard), Crispin Universal Air Valve, or equal.

## 2.23 SAFETY AND RELIEF VALVES

- A. Safety and relief valves shall conform to the latest requirements of the ASME Boiler and Pressure Vessel Code, Section I - Power Boilers, Section IV - Heating Boilers, or Section VIII - Unfired Pressure Vessels, as applicable. Valves for nontoxic or nonflammable gases shall be side outlet, unpacked, lifting lever type, constructed of materials suitable for the conditions of service. Valves for toxic or flammable gases or valves with pressure on the relief side shall be side outlet, closed cap type. All valves shall be National Board stamped and shall bear the approved nameplate. Valve relieving capacity shall not be less than 125 percent of heat input to be relieved.
- B. Relief valves for use in non-code piping for nonflammable liquids and gases shall have full-size side outlet, bronze body and disc, cadmium plated or stainless steel spring, unpacked lifting lever, and NPT threaded connections. Unless otherwise specified, valve shall be set to relieve at 25 percent above the pipeline working pressure. Non-code relief valves shall be suitable for relief settings from one to 250 psig and temperatures to 550°F.
- C. Domestic hot water heater relief valves shall be ASME rated, bronze body, combination temperature, and pressure type with lifting lever and corrosion-proof, thermal element extending into the tank. Valve shall conform with ANSI Z21.22 and shall be National Board stamped.
- D. Where specified, safety and relief valves shall be furnished with rupture disc on the pressure side of the valve. Rupture disc shall be of the knife-edge, reverse buckling type and shall be constructed of stainless steel. Rupture disc shall have a setpoint accuracy of  $\pm 5$  percent and working pressure of 90 percent of setpoint. A vented, indicating telltale shall be provided between disc and safety valve in accordance with ASME codes.
- E. Relief valves for relief of large quantities of low pressure gases shall be weight-loaded, combination type pressure/vacuum relief valves designed for high capacity venting at low over-pressure or vacuum with minimum blowdown. Valves shall have aluminum or stainless steel bodies, covers, hoods, and pallets, stainless steel springs and stems, and reinforced Teflon diaphragms. Low pressure/vacuum relief valves shall be as manufactured by Singer, Shand and Jurs, Varec Division of Emerson Electric, or equal.

## 2.24 PRESSURE RELIEF VALVES FOR WATER

- A. Pressure relief valves for cold water in sizes 1½ inches and smaller shall be direct acting, single seated, spring loaded, diaphragm operated, globe type. Valve shall have bronze body, stainless steel trim, resilient disc, stainless steel, Monel, or bronze diaphragm and outside,

tamperproof screw adjustment. Valve shall be suitable for 200 psi working pressure. Valve shall have NPT threaded ends per ANSI B2-1. Valve shall have no external packing glands. Seat, disc, and diaphragm shall be removable.

- B. Pressure relief valves for water in sizes 2 inches and larger shall be of the hydraulically operated, pilot actuated, diaphragm type globe or angle valves designed to relieve excessive pressure, sustain a constant back pressure, and prevent surges. The valve shall be fast opening and slow closing and shall be cushioned to prevent water hammer. Speed of opening and closing shall be adjustable. Valve shall be suitable for 175 psi working pressure. Setpoint shall be externally adjustable by means of tamperproof screw adjustment.
- C. The valve shall have a cast iron body and bolted bonnet conforming to ASTM A 126, Class B, or ASTM A 48, Class 30, bronze pilot and main valve trim, resilient seat disc, stainless steel pilot trim, and reinforced synthetic rubber diaphragm. Seat ring, disc, and diaphragm shall be removable without removing valve from line. No external packing glands shall be used and the diaphragm shall not be used as a seating surface. Valve stem shall be guided at both ends. Pilot control shall be of the diaphragm actuated, spring-loaded type.
- D. A fine mesh stainless steel or Monel strainer shall be provided in the pilot control piping to protect the pilot valve. An indicator rod shall be provided to show valve position.
- E. Valve shall be provided with 125-pound flanged ends drilled per ANSI B16.1.
- F. Pilot actuated pressure relief valves shall be Clayton Figure 50G, OCV Series 108-3, or equal.

## 2.25 ALTITUDE VALVES

- A. Altitude valves shall be single-acting, hydraulically operated, pilot actuated, diaphragm or piston type globe valves designed for ground level control of water level in storage tanks. Valve shall be of the non-throttling differential type and shall be air and water cushioned on closing to prevent surges on shutoff. Valve shall be suitable for 175 psi working pressure. Operating point and closing speed shall be adjustable.
- B. Valve shall have a cast iron body and bolted bonnet conforming to ASTM A 126, Class B, bronze pilot control valve and main valve trim, resilient seat disc, stainless steel pilot trim, and reinforced synthetic rubber diaphragm. Seat ring, disc, and diaphragm shall be removable without removing the valve from the line. Piston type valves shall be constructed with removable resilient seals and guides to prevent metal-to-metal contact. No external packing glands shall be used and the diaphragm shall not be used as a seating surface. Main valve stem shall be guided at both ends. Pilot control shall be three-way, hydraulically balanced, diaphragm type.
- C. An indicator rod shall be provided to show valve position. A fine mesh stainless steel or Monel strainer shall be provided in the control piping. A 4<sup>1</sup>/<sub>2</sub>-inch pressure gauge calibrated in both psi and feet of water shall be provided on both sides of the altitude valve.
- D. Valve shall be furnished with flanged ends drilled per ANSI B16.1.

- E. A standard repair kit shall be supplied for the altitude valve. Kit shall include liner cup, seat ring, cover gasket, indicator packing, vent packing, and piston cup for main valve, seat ring, lower packing, upper packing, stem gasket, and diaphragm for pilot.
- F. Altitude valves shall be GA Industries Figure 3200-D; Clayton Figure 206, OCV Series 3331; or equal.

## 2.26 ANTI-CAVITATION BACKPRESSURE/RELIEF/RECIRCULATION VALVE

### A. Submittals

- 1. Submit detailed product data and descriptive literature including dimensions, weights, headloss data, pressure rating and materials of construction.
- 2. Provide shop drawings that clearly illustrate the general arrangement of the equipment and cross-sectional views of the components.

### B. Quality Assurance

Supplier shall have been manufacturing anti-cavitation automatic control valves for a period of at least 10 years and shall, at the request of the Engineer, provide a list of installations involving equipment of similar size and application.

### C. Anti-Cavitation Valve

- 1. Construction. Valve shall consist of a main valve assembly and a system of hydraulic controls completely assembled and tested as a unit and ready for field installation.
- 2. Main Valve
  - a. Main valve body shall be angle style, constructed of high-strength cast iron conforming to ASTM A126 Class B with integral flanges, faced and drilled per ANSI B16.1 Class 125.
  - b. The main valve shall operate on the differential piston principle such that the area on the underside of the piston is no less than the pipe area and the area on the upper surface is greater than that of the underside. There shall be no diaphragms or springs in the main valve.
  - c. The valve piston shall be fully guided on its outside diameter and all guiding and sealing surfaces shall be bronze. There shall be a renewable, resilient seat attached to the piston that seats against a non-corrosive metallic body seat. A stainless steel perforated skirt shall be attached to the piston and all throttling shall occur through precision-machined orifices, the diameter, quantity and orientation of which shall be engineered to match each valve's specified flow and pressure drop requirements. The valve design shall locate the seat upstream of the severe throttling to protect the seat from the effects of cavitation. A visual indicator of valve position shall be provided.
  - d. A replaceable, stationary stainless steel liner shall be installed in the outlet of the valve to contain the flow immediately downstream of the point of severe throttling to protect the valve body. The perforated skirt and outlet liner shall be the only components exposed to cavitation. The valve shall be fully capable of operating in any position without the need of springs and shall not incorporate stems, stem guides or spokes in the waterway.
  - e. The main valve shall be serviceable in the line through a single flanged cover that provides easy access to all internal components.

### 3. Controls

- a. Provide a system of hydraulic controls to enable the valve to perform the functions listed below. All controls and control piping shall be suitable for the working pressure.
  - b. Provide a direct-acting, spring-loaded, normally closed over pressure pilot with stainless steel body and trim.
  - c. Provide a stainless steel needle valve for adjustable closing speed control
  - d. Provide a wye-strainer with stainless steel screen and pilot isolating valves
- D. Function - The valve shall be tightly closed as long as the inlet pressure is below the setting of its pilot. The valve shall open when the inlet pressure rises to the pilot setting and throttle as necessary to maintain or limit the inlet pressure as set on its pilot.
- E. Manufacturer – The valve shall be GA Industries, Inc., Series 8500, Figure 8566-D

## 2.27 MANUAL VALVE OPERATORS

- A. Unless otherwise shown or specified, all valves shall be furnished with manual operators as follows:
1. Gate Valves
    - a. Buried: Extension stem and valve box with standard operating nut.
    - b. Submerged or Located in Deep Vault - Extension stem with floorstand and handwheel operator.
    - c. Exposed
      - 1) Less than 7 feet above working surface – Handwheel operator.
      - 2) More than 7 feet above working surface – Chainwheel operator.
  2. Globe Valves: All – Handwheel operator.
  3. Butterfly and Plug Valves
    - a. Buried: Rotary manual operator with extension stem and valve box and standard operating nut.
    - b. Submerged or Located in Deep Vault: Rotary manual operator with extension stem and floorstand with handwheel.
    - c. Exposed
      - 1) Less than 7 feet above working surface: Lever operator (6 inch and smaller) or rotary manual operator and handwheel.
      - 2) More than 7 feet above working surface: Rotary manual operator and chainwheel.
- B. Operating nuts for buried or submerged valves shall be standard 2-inch square nuts and shall conform to AWWA C500, Section 19. Extension stems, valve boxes, and stem guides shall be furnished where shown, specified, or required for proper operation.
- C. Hand lever operators shall have heavy-duty, cast iron bracket, cast iron latching lever, and self-lubricating bushings and shall be capable of securing the valve at the fully open and fully closed position and a minimum of five intermediate positions. Lever operators shall be installed so that the lever is parallel with the axis of the pipe in which the valve is installed when the valve is fully open.



- D. Rotary manual operators for aboveground service shall be of the worm and worm gear or of the traveling nut type. Rotary operators shall have a heavy-duty, weatherproof cast iron or steel housing with gasketed, removable cover and shall be equipped with a mechanical dial or slot type position indicator and a suitable handwheel. Manual operators shall be totally enclosed and sealed to prevent the entrance of rain, dirt, and corrosive atmospheres. Traveling nut operators shall have a grease-lubricated alloy steel screw stem, brass nut, and self-lubricating bronze bushings. Worm gear operators shall have hardened, grease lubricated alloy steel worms and bronze worm gears. All exterior bolts and fasteners shall be bronze or stainless steel for corrosion resistance. Valve shall open with counter-clockwise rotation of the handwheel.
- E. Manual rotary operators for buried or submerged service shall conform with the requirements of Item D above except the operator shall be totally enclosed and completely sealed to prevent the entrance of water and dirt. Buried or submerged operators shall be finished on the outside with a bituminous or other approved coating. Rotary operators for buried or submerged service shall be capable of withstanding 300 ft-lbs of torque on the operating nut or handwheel. A corrosion resistant, dial-type valve position indicator shall be provided at the operating nut on the extension stem of buried operators to provide a remote indication of valve position.
- F. Chain wheel operators shall be of heavy cast iron construction and shall be equipped with chain guide and looped, flexible, operating chain. Chain shall be heavily galvanized or cadmium plated and shall extend to within 60 inches of the floor.
- G. All manual rotary and lever operators shall be capable of seating or unseating the valve disc under the most adverse conditions in the particular application with not more than an 80-pound pull on the handwheel or lever. Valve operators shall be capable of holding the valve in any position between fully open and fully closed without creeping or fluttering. Operators shall be provided with adjustable, mechanical, stop-limiting devices to prevent over-travel of the valve disc in the open and closed positions. Manual rotary and lever operators shall comply with all applicable requirements of AWWA C504, Sections 11.1, 11.2, and 11.3.

## 2.28 NONMODULATING ELECTRIC MOTOR OPERATORS

- A. Where shown or specified, valves shall be furnished with a nonmodulating electric motor operator. The electric motor operator shall include the motor, reversing contactors, fused control power transformer, operator unit gearing, limit switch gearing, limit switches, torque switches, control relays, interconnecting wiring, stem nut for rising stem valves, declutch lever or knob, and auxiliary handwheel as a self-contained unit. The motor operator shall be housed in a NEMA 4 weatherproof housing, sealed against the entrance of rain, dirt, and corrosive atmospheres with O-rings or compressible gaskets. The operator shall be sized to move the valve from fully open to fully closed in approximately 60 seconds.
- B. The motor shall be specifically designed for valve operator service and shall be of high torque, totally enclosed, nonventilated construction, with motor leads brought into the limit switch compartment. Motor insulation shall be NEMA Class B or Class F with a maximum continuous rise of 80°C over an ambient of 40°C. Motor shall be designed to operate on 460-

volt, 60-hertz, 3-phase power unless otherwise shown or specified. The motor shall be of sufficient size to open or close the valve against the maximum expected differential pressure when voltage to the motor terminals is 10 percent above or below nominal voltage. Motor torque at stall shall be not less than two times that required to operate the valve at maximum differential. Motor shall be capable of continuous operation for a period of 15 minutes at a torque output equal to 40 percent of the maximum seating/unseating torque without overheating. Motor frame shall be NEMA standard. The motor shall be prelubricated and all bearings shall be of the anti-friction type. Motor shall be easily removable without dismantling the operator and shall be furnished with inherent thermal overload protection and space heater.

- C. The operator shall be a double reduction unit with the capability of quickly changing the output speed with a simple gear change. The power gearing shall consist of generated spur or helical gears of heat-treated steel and worm gearing. The worm shall be of hardened alloy steel and the worm gear shall be of alloy bronze accurately cut with a hobbing machine. All power gearing shall be grease or oil lubricated. Ball or roller bearings shall be used throughout. Oil lubricated models shall be furnished with oil fill and drain plugs and dipstick or sight glass.
- D. Limit switches and associated gearing shall be an integral part of the valve operator. Limit switch gearing shall be of the intermittent type, totally enclosed in its own gear case to prevent dirt and foreign matter from entering the gear train, grease-lubricated, and shall be made of bronze or stainless steel. Limit switches shall be of the adjustable type capable of being set to trip at any point of valve travel between fully open and fully closed, and not be subject to breakage or slippage due to overtravel. Limit switches shall be gear driven by the valve operating mechanism and shall be in step at all times whether in manual or motor operating mode.

Limit switches shall be of the heavy-duty, open-contact type with rotary wiping action. Microswitches or similar switch configurations are not acceptable.

Each electric valve operator shall have a minimum of two rotor-type switch assemblies and a minimum of two normally open and two normally closed contacts per rotor.

- E. Each electric valve operator shall be equipped with a double torque switch which is responsive to loads encountered in either the opening or closing direction. Each side of the switch shall have a numbered dial and shall be adjustable. A calibration tag shall be mounted near each switch correlating dial setting with unit output torque. Torque switch setting shall be easily adjusted with a screwdriver.

The torque switch shall operate during the complete valve cycle without the use of auxiliary relays, linkages, latches, or other devices. The torque switch shall be wired to shut off the actuator motor in the event excessive torque is being generated in either direction of travel. The closing torque switch shall be wired to shut off the operator motor when a predetermined torque is reached which corresponds to the required seating thrust for wedging gate or globe valves.

Operator shall be provided with a contact to prevent nuisance tripping of the torque switch when the valve becomes jammed in the closed position. The contact shall allow the valve to open slightly then restore torque protection throughout the remaining valve travel.

- F. The valve operator shall have a stem nut of high tensile bronze or other material, compatible with the valve stem and suited to the application. The nut arrangement shall be of the two-piece type to simplify field replacement. The stem nut for rising stem valves must be capable of being removed from the top of the actuator without removing the actuator from the valve, disconnecting the electrical wiring, or disassembling any of the gearing within the actuator.
- G. A handwheel shall be provided for manual operation. The handwheel shall not rotate during motor operation nor shall a fused motor prevent manual operation. When in manual operating position, the unit will remain in this position until motor is energized at which time the valve operator will automatically return to electric operation and shall remain in motor position until handwheel operation is desired. This movement from motor operation to handwheel operation shall be accomplished by a positive declutching knob or lever which will disengage the motor and motor gearing mechanically but not electrically. Alternately, an automatic declutching mechanism actuated by motion of the handwheel is acceptable. Hand operation must be reasonably fast and require no more than 80 pounds of rim effort at a maximum required torque. It shall not be possible for the unit to be simultaneously in manual and motor operation. Handwheel shall open the valve with counterclockwise rotation and shall have an arrow and the word OPEN cast in raised letters on the rim.
- H. The valve operator shall have a built-in lost motion device that travels sufficiently enough to allow the motor to reach full speed before imparting a hammer blow to start valve in motion in either the closing or opening direction. This lost motion device also must permit motor to attain full speed before load is encountered, and load should be shared equally by two lugs cast integrally on the drive sleeve.

Lost motion device is not to be provided for those valves used in inching, throttling, regulating, or modulating service.

- I. The limit switches, torque switch, control circuits, and terminal strip connections shall be accessible by removing the cover of the limit switch compartment. A thermostatically-controlled, 120-volt space heater shall be provided in the limit switch compartment.
- J. A mechanical, dial-type position indicator shall be provided on the valve operator housing for a continuous local indication of valve position.
- K. Unless otherwise specified, a push-button valve control station shall be provided integral with the valve operator housing. The control station shall have open, stop, and close push buttons and red (open) and green (closed) position indicating lights. Lights and push buttons shall be heavy-duty and oil-tight. Where specified, a separately-mounted push-button valve control station with an automatic-manual selector switch in addition to the above listed controls shall be furnished. Separately-mounted control stations shall have a stainless steel or cast aluminum enclosure and shall be rated NEMA 4. Selector switch shall have an extra set of contacts to indicate to the computer system when the valve is under automatic control.

- L. A rotary operator shall be furnished for electric motor operators on butterfly and plug valves. Rotary operators shall conform with the applicable requirements of Part 2.24 of this section.
- M. Where shown or specified, electric motor operators shall be mounted on a floorstand remotely from the valve. An extension stem shall be furnished to connect the electric motor operator and the valve.
- N. Electric valve operators shall be as manufactured by Limitorque, EIM, or equal.

## 2.29 NONMODULATING PNEUMATIC CYLINDER OPERATORS

- A. Where shown or specified, valves shall be furnished with a nonmodulating pneumatic cylinder operator. Nonmodulating pneumatic cylinder operators for on/off butterfly and plug valves shall be of the double-acting type of rack and gear, slotted (scotch) yoke, or swivel (trunnion-mounted) design.
- B. Rack and gear operators and scotch yoke operators shall have a weatherproof, heavy-duty cast iron or steel housing with removable, gasketed cover. The housing shall be totally enclosed and sealed against the entrance of rain, dirt, and corrosive atmospheres. Rack and gear operators shall have grease lubricated, hardened alloy steel rack and pinion gearing. Scotch yoke operators shall have a slotted, cast iron or steel yoke, cast iron or steel yoke nut, and renewable bronze bushings. Swivel or trunnion-mounted operators shall have a steel or cast iron cross-head bracket with stainless steel trunnion pins and locked-in, renewable bronze bushings and a cast iron valve lever with locked-in, renewable bronze bushings and stainless steel lever pin. Valve position on all operators shall be mechanically indicated by a dial-type or slot-type indicator on the operator crosshead or housing. Operator shall be equipped with adjustable, mechanical stops to prevent overtravel of the valve disc or plug in the open or closed positions.
- C. Pneumatic cylinders shall be constructed of centrifugally cast aluminum manganese bronze, hard-coated aluminum alloy, or glass fiber reinforced epoxy with special low friction additives. Inside surfaces of cylinder shall have a 16-micro-inch or smoother finish. Piston and cylinder heads shall be of cast bronze, hard-coated aluminum alloy, or nonmetallic materials. Piston rod, nut, and lockwasher shall be of stainless steel, and the rod shall have a 4-8 micro-inch finish with a surface of hard chrome plating, minimum 0.0005 inch thick. Piston rings and the piston rod seal shall be of the self-adjusting, wear compensating type and made of Buna-N rubber. Piston rod seal assembly shall be contained in a removable, corrosion-resistant recess, allowing replacement of the seals without removing the cylinder heads. Piston rod dirt wipers shall be installed on both sides of the piston rod seal. Adjustable cushions shall be provided on each end of the cylinder. Flexible hoses shall be furnished by the valve operator manufacturer for connections from the cylinder ports to the mounting bracket. Pneumatic cylinders shall be suitable for operating pressures of up to 100 psig. All cylinder components shall be designed with a minimum factor of safety of five at maximum rated operating pressure. Cylinder shall be prelubricated at the factory.
- D. The cylinder operator shall be furnished with 120-volt, four-way solenoid valve and speed control valves. Speed control valves shall include a bronze needle valve on each instrument air connection to the pneumatic cylinder. The pneumatic cylinder shall open at a rate controlled

by one needle valve setting and close at a rate determined by the other needle valve setting. The four-way solenoid valve, speed control valves, and all interconnecting piping and hoses shall be furnished completely assembled on the valve operator. Unless otherwise specified, valves shall be adjusted to move from fully open to fully closed and vice versa in a time interval of 5 to 10 seconds.

- E. Where shown or specified, the pneumatic operator shall be furnished with a manual rotary operator and handwheel sized to allow manual operation of the valve in the event of instrument air supply failure.
- F. Where required, a lubricator of the oil fog type shall be furnished on the air supply line to the pneumatic cylinder operator. It shall be  $\frac{1}{4}$ -inch in size with  $\frac{1}{2}$ -pint visible oil supply and shall be Norgen Type 10-002-006, Parker-Hannifin Model LS-3025, or equal.
- G. Pneumatic cylinder operators shall be designed and sized in accordance with the applicable requirements of AWWA C504, Section 11. Unless otherwise shown or specified, pneumatic cylinder operators shall be designed for operation on an 80 psig supply pressure.

### 2.30 EXTENSION STEMS

- A. Extension stems shall be solid steel not smaller than the stem of the valve or galvanized steel pipe having an inside diameter not smaller than outside diameter of the valve or valve operator stem. Extension stems shall connect to the valve by a flexible, socket coupling. All couplings shall be pinned, keyed, or socket type.
- B. Each extension stem for buried valves shall extend to within 6 inches of the top of valve box or floor box and shall be provided with spacers that will center the stem in the valve box. A standard wrench nut shall be provided on the top of extension stem. Extension stems for rising stem valves shall be stainless steel or carbon steel with bronze or stainless steel sleeves. Sleeves shall be of sufficient length and location to extend through each stem guide throughout the full vertical stem travel. Extension stems for submerged service shall be stainless steel or bronze.
- C. Stem guides shall be of bronze-bushed, cast iron construction adjustable in two directions. Stem guides shall be installed so the unsupported length of the extension stem does not exceed 10 feet or an L/r of 200.
- D. Bevel gear extension stems shall be furnished where it is impractical to locate the floorstand directly over the valve. Such stems shall include a sufficient number of bearings to permit easy operation of the valves.

### 2.31 FLOORSTANDS

- A. Floorstands shall be of the heavy pattern type and shall be constructed of cast iron or steel. Floorstand shall have a height of approximately 36 inches. The floorstand shall have an integral bottom flange suitable for bolting to a concrete floor.

- B. Floorstands for manually operated non-rising stem valves shall be furnished with a slot-type position indicator in the floorstand body. Floorstands for rising stem valves shall have a removable stem cover with slot-type position indicator. Stem covers shall consist of a galvanized, slotted steel pipe attached to the top of the floorstand with a pointer riding up and down in the slot. The open and closed points shall be marked on the pipe cover.
- C. Floorstands for rising-stem valves shall be provided with a bronze operating nut supported by tapered, grease-lubricated roller or ball bearings. Positive mechanical seals shall be provided on the operating nut where it passes through the floorstand housing to retain lubricant and exclude moisture and dirt. Lubricating fittings shall be provided for lubricating bearings.
- D. Handwheels shall have a minimum diameter of 14 inches and shall be designed to seat or unseat the valve at the maximum differential with not greater than a 40 pound tangential pull on the handwheel rim. An arrow and the word "OPEN" shall be cast on the handwheel in raised letters.
- E. Each floorstand shall have a conspicuous, permanently-attached nameplate showing the valve manufacturer's name, valve size, model designation, serial number, and any other pertinent information. Nameplate shall be of corrosion resisting metal with raised or stamped lettering and contrasting background.
- F. Floorstands shall be set vertical and plumb with the valve operating stem for free operation without binding or distortion. Floorstand shall be shimmed and grouted in place as required for proper installation.
- G. Following manufacture, interior and exterior, non-machined, nonbearing ferrous floorstand surfaces shall be blast-cleaned and painted at the factory with one coat of zinc chromate primer conforming to Federal Specification TT-P-645 and one coat of compatible alkyd enamel.

Interior surfaces of floorstands shall be protected for the life of the unit by a minimum of three coats of an approved paint.

## 2.32 VALVE BOXES

- A. All buried valves shall be provided with three-piece, cast iron, extension sleeve type, valve boxes suitable for the depth of cover as shown on the Drawings.
- B. Valve boxes shall not be less than 5 inches in diameter, shall have a minimum thickness of 3/16-inch at any point, and shall be provided with suitable cast iron bases and covers. Covers shall have cast thereon an appropriate name designating the service for which the valve is intended ("W" for water, "S" for drain or waste lines). Covers in roadways shall be of the deep locking type.
- C. All parts of valve boxes, bases, and covers shall be heavily coated with a suitable bituminous finish.

- D. Valves and boxes shall be set plumb. Each valve box shall be placed directly over the valve it serves with the top of the box flush with the finished grade.

### 2.33 T-HANDLE OPERATING WRENCH

- A. The Contractor shall furnish four T-handle, steel valve operating wrenches with sockets compatible with standard 2-inch square valve operating nuts.
- B. The operating wrenches shall be at least 36 inches in length.

### 2.34 SPARE PARTS

- A. The following spare parts shall be furnished where applicable for the valves specified herein:
  - 1. Stem packing - One set each type and size valve
  - 2. Renewable stainless steel or bronze seat ring - One each type and size valve
  - 3. O-ring stem or shaft seals - One set each type and size valve
  - 4. Resilient seat or disc - One each type and size valve
  - 5. Shaft bearings or bushings - One set each type and size valve
  - 6. Hinge pin, disc, spring, - One set each size check valve and disc bolts
  - 7. Gaskets - One set each type and size valve
  - 8. Special tool or seat wrench - One each required for valve servicing and maintenance
- B. The following spare parts shall be furnished for electric motor operators:
  - 1. O-rings and seals - One set each operator
  - 2. Fuses - Three each size and type
  - 3. Indicator lights - Three each type
  - 4. Operating nut for rising stems - One each operator
  - 5. Lubricant – 1-year supply each operator
- C. The following spare parts shall be furnished for pneumatic cylinder operators:
  - 1. O-rings, rod seals, and wipers - One set each operator
  - 2. Pins and bushings - One set each operator
  - 3. Pneumatic cylinder and air control assembly - One each size
- D. Spare parts shall be suitably protected against corrosion and impact to withstand long-term storage. All parts shall be clearly labeled and identified by manufacturer's name and number and the valve to which they belong.

## PART 3 EXECUTION

### 3.1 FACTORY TESTS

- A. All valves shall be tested at the point of manufacture for proper and unobstructed operation and for leakage and adequacy of design.
- B. Iron body gate valves shall be tested in accordance with AWWA C500, Section 29.
- C. Butterfly and plug valves shall be tested in accordance with AWWA C504, Section 13.

- D. Iron body check valves shall be tested in accordance with AWWA C508, Section 5.
- E. All other valves shall be given an operation test, a leakage test at rated pressure differential, and a hydrostatic test at two times rated pressure. During the hydrostatic test, there shall be no leakage through the metal, the end joints, or the shaft or stem seal, nor shall any part be permanently deformed. During the leakage test, leakage shall not exceed that permitted by ANSI B16.104, Class IV, for metal seated valves and Class VI for resiliently seated valves.

### 3.2 INSTALLATION

- A. All valves shall be installed in strict conformance with the Drawings and approved shop drawings and manufacturer's instructions.
- B. Unless otherwise shown or specified, butterfly valves shall be installed with stems in the horizontal position.
- C. Double plate, clapper type check valves in horizontal piping shall be installed with the stem in the vertical position.
- D. Safety and relief valves shall be installed in a vertical position. Valves relieving compressed gases or liquids at a temperature above atmospheric boiling point shall be piped full size outside of building so discharge cannot hit any person or structure. Valves relieving liquids below their boiling points shall be piped full size to the nearest floor drain.
- E. Swing check valves shall be installed only in a horizontal position. Lever shall be free to operate without obstruction.
- F. All underground valves shall be installed using a concrete valve box with cast iron frame and cover or in a cast iron valve box as specified herein.
- G. Four-way solenoid valves shall exhibit no leakage in either position.
- H. Valves shall be installed in such a way that operators and packing are easily accessible. Valves with field replaceable seats shall be installed with sufficient clearance to permit removal of valve bonnet and stem without removing valve from the line.

### 3.3 FIELD TESTING

Following installation, all valves shall be tested by the Contractor under the anticipated operating conditions. The ability of the valves to operate properly without leakage, binding, sticking, fluttering, or excessive operating torque shall be demonstrated to the satisfaction of the Engineer. The Contractor shall at his own expense adjust and/or replace any valve as necessary to assure satisfactory operation.

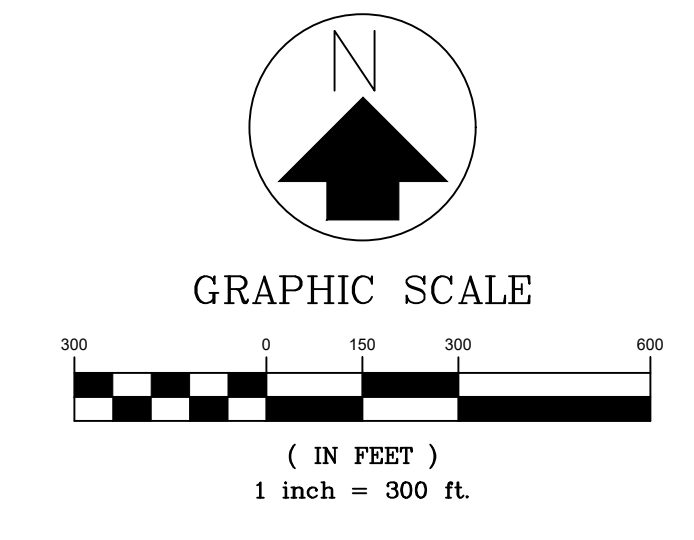
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**SITE MAP & INDEX OF DRAWINGS**  
**COLLEGE RD. FORCE MAIN**  
**KWRU**

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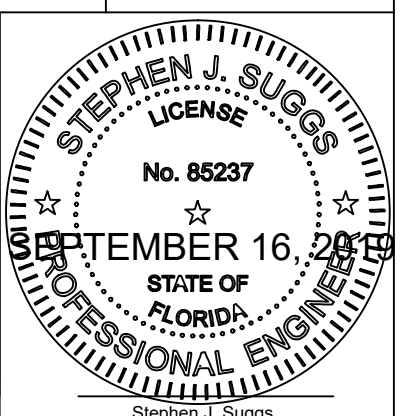
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- D-01 TRENCH AND VALVE BOX DETAILS
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Description	Revisions

This item has been digitally signed and sealed by Stephen J. Suggs on the date adjacent to the seal.

Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.



Stephen J. Suggs  
 Professional Engineer  
 State of Florida  
 Registration No. 85237

**PRE-CONSTRUCTION REQUIREMENTS**  
 THE CONTRACTOR SHALL VISIT THE PROJECT SITE PRIOR TO CONSTRUCTION TO FAMILIARIZE HIMSELF/HERSELF WITH THE CONDITIONS FOR CONSTRUCTION ACTIVITIES. THE CONTRACTOR SHALL OBTAIN FROM THE OWNER A WRITTEN LIST OF ALL PERMITS AND COPIES THEREOF, AND CAREFULLY REVIEW ALL PLANS, SPECIFICATIONS, AND PERMITS PREVIOUSLY SECURED ON BEHALF OF THE OWNER. IN CASE OF ANY DISCREPANCY EITHER IN PERMIT DOCUMENTS, PLANS, DRAWINGS, OR SPECIFICATIONS, THE CONTRACTOR MUST PROMPTLY SUBMIT A "WRITTEN CLARIFICATION REQUEST" TO THE OWNER, WHO WILL PROMPTLY FORWARD SAME TO THE ENGINEER WHO WILL MAKE A DETERMINATION IN WRITING. THE CONTRACTOR MUST VERIFY EXISTING FACILITY INFORMATION, AND ALL DESIGN/PERMIT DATA REQUIRED FOR WORK THAT IS TO CONNECT WITH EXISTING FACILITIES. ANY DISCREPANCIES BETWEEN THE CONTRACT REQUIREMENTS AND THE EXISTING CONDITIONS MUST BE REFERRED TO THE OWNER, IN WRITING, FOR AN ENGINEERING DETERMINATION. ANY FUTURE ADJUSTMENT DUE TO FAILURE BY THE CONTRACTOR TO IDENTIFY THE RELATED DISCREPANCY, WILL BE AT THE CONTRACTOR'S EXPENSE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ANY LICENSES ADDITIONAL PERMITS, AND FOR COMPLYING WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL LAWS, CODES, AND REGULATIONS IN CONNECTION WITH THE PERFORMANCE OF THE WORK. PRE-CONSTRUCTION VIDEO OR PICTURES FOR SUBMITTAL REVIEW PRIOR TO FIRST PROGRESS MEETING.

**CONSTRUCTION SAFETY AND LIABILITY**  
 THE CONTRACTOR MUST TAKE PROPER SAFETY AND HEALTH PRECAUTIONS TO PROTECT THE WORK, THE WORKERS, THE PUBLIC, AND THE PROPERTY OF OTHERS. THE CONTRACTOR IS RESPONSIBLE ALSO FOR ALL MATERIALS DELIVERED AND WORK PERFORMED UNTIL COMPLETION AND ALL ACCEPTANCES HAVE BEEN OBTAINED. THE CONTRACTOR IS RESPONSIBLE FOR ALL DAMAGE TO PERSONS OR PROPERTY THAT OCCURS AS A RESULT OF HIS NEGLIGENCE. THE CONTRACTOR MUST SAVE HARMLESS AND INDEMNIFY THE OWNER AND THE ENGINEER OF RECORD, ITS OFFICERS, REPRESENTATIVES AND EMPLOYEES FROM ALL CLAIMS, LOSS, DAMAGE, ACTIONS, CAUSES OF ACTION, AND/OR EXPENSES RESULTING FROM, BROUGHT FOR, OR ON ACCOUNT OF ANY PERSONAL INJURY OR PROPERTY DAMAGE RECEIVED OR SUSTAINED BY ANY PERSONS OR PROPERTY GROWING OUT OF OCCURRING, OR ATTRIBUTABLE TO ANY WORK PERFORMED UNDER OR RELATED TO THIS CONTRACT, RESULTING IN WHOLE OR IN PART FROM THE NEGLIGENCE ACTS OR OMISSIONS OF THE CONTRACTOR, ANY SUBCONTRACTOR, OR ANY EMPLOYEE, AGENT, OR REPRESENTATIVE OF THE CONTRACTOR OR ANY SUBCONTRACTOR.

UNLESS OTHERWISE SPECIFIED BY THE UTILITY, THE CONTRACTOR SHALL NOTIFY THE SUPERINTENDENTS OF THE WATER, GAS, SEWER, TELEPHONE, AND POWER COMPANIES, 10 DAYS IN ADVANCE, THAT HE INTENDS TO START WORK IN A SPECIFIC AREA, THE OWNER AND ENGINEER DISCLAIM ANY RESPONSIBILITY FOR THE SUPPORT AND PROTECTION OF SEWERS, DRAINS, WATER LINES, GAS LINES, CONDUITS OF ANY KIND, UTILITIES OR OTHER STRUCTURES OWNED BY THE CITY, COUNTY, STATE OR BY PRIVATE OR PUBLIC UTILITIES LEGALLY OCCUPYING ANY STREET, ALLEY, PUBLIC PLACE, RIGHT-OF-WAY, OR EASEMENT.

**PROJECT SIGN**  
 THE CONTRACTOR SHALL PROVIDE AND MAINTAIN A CONSTRUCTION PROJECT SIGN AT A LOCATION DIRECTED BY THE OWNER. THE WEILER ENGINEERING CORPORATION SHALL PROVIDE A SIGN FOR INSTALLATION BY THE CONTRACTOR AT THIS LOCATION. THESE SIGNS SHALL BE ERECTED WITHIN 15 DAYS AFTER RECEIVING A NOTICE TO PROCEED. UPON PROJECT COMPLETION, THE CONTRACTOR SHALL REMOVE THESE SIGNS AND RETURN TO WEILER ENGINEERING CORPORATION THEIR SIGN.

**ENVIRONMENTAL PROTECTION DURING CONSTRUCTION**  
 PROTECTION OF LAND RESOURCES - EXCEPT IN AREAS IDENTIFIED ON THE PLANS TO BE CLEARED, THE CONTRACTOR MUST NOT DEFACE, INJURE, OR DESTROY TREES OR SHRUBS OR REMOVE OR CUT THEM WITHOUT WRITTEN AUTHORIZATION FROM THE OWNER. IN THE ABSENCE OF A CLEARING PLAN, AREAS SHOWN FOR IMPROVEMENTS SHALL BE CLEARED UNLESS NOTED OTHERWISE.

**PROTECTION OF WATER RESOURCES - IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO INVESTIGATE AND COMPLY WITH ALL APPLICABLE FEDERAL, STATE, REGIONAL COUNTY AND MUNICIPAL LAWS CONCERNING POLLUTION OF WATER RESOURCES. ALL WORK MUST BE PERFORMED IN SUCH A MANNER THAT OBJECTIONABLE CONDITIONS WILL NOT BE CREATED IN PUBLIC WATERS RUNNING THROUGH, OR ADJACENT TO THE PROJECT AREA.**

- EROSION AND SEDIMENT CONTROL - ALL PRACTICABLE AND NECESSARY MEASURES SHALL BE TAKEN DURING CONSTRUCTION TO CONTROL AND PREVENT EROSION AND THE TRANSPORT OF SEDIMENT TO SURFACE DRAINS, SURFACE WATER, OR INTO OTHER PROPERTY BY ANY OR ALL OF THE FOLLOWING METHODS:
  - STORMWATER FACILITIES ARE TO BE BUILT AS EARLY IN THE CONSTRUCTION PHASE AS POSSIBLE TO ENSURE THE TREATMENT OF STORMWATER RUNOFF. TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES, HOWEVER, SUCH AS BERMS, SEDIMENT BASINS, GRASSING, SODDING, SAND BAGGING, BALED HAY OR STRAW, FLOATING SILT BARRIERS, STACKED SILT BARRIERS, ETC., MUST BE PROVIDED AND MAINTAINED UNTIL THE PERMANENT FACILITIES ARE COMPLETED AND OPERATIONAL.
  - REVEGETATION AND STABILIZATION OF DISTURBED GROUND SURFACES SHOULD BE ACCOMPLISHED AS SOON AS POSSIBLE.
  - FULL COMPACTION OF ANY FILL MATERIAL PLACED AROUND NEWLY INSTALLED STRUCTURES.
  - PROHIBIT THE USE OF ANY CONSTRUCTION EQUIPMENT THAT LEAKS EXCESSIVE AMOUNTS OF FUEL OIL, OR HYDRAULIC FLUID.

- ALL DISTURBED AREAS SHALL BE GRADED FOR POSITIVE DRAINAGE, EXCEPT RETENTION AREAS, AND SHALL BE STABILIZED BY SODDING, EXCEPT WHERE SEEDING AND MULCHING ARE CALLED FOR ON THE PLANS. THE LATEST VERSION OF THE F.D.O.T. ROAD AND BRIDGE SPECIFICATIONS SHALL BE USED UNLESS MORE RESTRICTIVE LOCAL SPECIFICATIONS EXIST.

CONTRACTOR RESPONSIBLE FOR STABILIZING AND MAINTAINING SLOPES AND SOD THROUGHOUT CONSTRUCTION UNTIL SUCH TIME AS APPROVED BY THE ENGINEER.

**PROTECTION OF FISH AND WILDLIFE**  
 THE CONTRACTOR MUST AT ALL TIMES PERFORM ALL WORK IN A WAY AND TAKE SUCH STEPS AS REQUIRED TO PREVENT ANY INTERFERENCE WITH OR DISTURBANCE TO FISH AND WILDLIFE. THE CONTRACTOR SHALL NOT ALTER WATER FLOWS OR OTHERWISE DISTURB NATIVE HABITATS AND JURISDICTIONAL WETLANDS LOCATED WITHIN AND/OR ADJACENT TO THE PROJECT AREA.

**RECORDING AND PRESERVING HISTORICAL AND ARCHEOLOGICAL FINDS**  
 ALL ITEMS HAVING ANY APPARENT HISTORICAL OR ARCHEOLOGICAL INTEREST THAT ARE DISCOVERED IN THE COURSE OF ANY CONSTRUCTION ACTIVITIES MUST BE CAREFULLY PROTECTED. THE CONTRACTOR MUST LEAVE THE ARCHEOLOGICAL FIND UNDISTURBED AND MUST IMMEDIATELY REPORT THE FIND TO THE OWNER SO THAT THE PROPER AUTHORITY MAY BE NOTIFIED.

**EARTHWORK**  
 I. GENERAL  
 1.01 SUBMITTALS  
 A. EROSION AND CONTROL MEASURES  
 B. COMPACTION TESTS  
 C. SOIL CLASSIFICATION TESTS  
 D. PRESERVATION PLANS  
 1-02 SITE EXAMINATION  
 A. CONTRACTORS, BEFORE SUBMITTING BIDS, SHALL INFORM THEMSELVES AS TO LOCATION AND NATURE OF THE WORK, CHARACTER OF EQUIPMENT AND FACILITIES NEEDED FOR PERFORMANCE OF THE WORK. GENERAL AND LOCAL CONDITIONS PREVAILING AT THE SITE, AND OTHER MATTERS WHICH MAY IN ANY WAY, AFFECT THE WORK UNDER CONTRACT.  
 B. EXAMINE SOURCES OF INFORMATION CONCERNING GROUND WATER LEVEL, WHETHER SURFACE OR SUBSURFACE. EACH BIDDER TO DRAW HIS OWN CONCLUSION CONCERNING GROUND WATER LEVELS AND HOW WATER AFFECTS HIS WORK.

1-03 SUBSURFACE INVESTIGATIONS  
 A. SUBSURFACE DATA, INCLUDING GROUND WATER ELEVATIONS OR CONDITIONS, IF SHOWN ON THE DRAWINGS OR ATTACHED TO THESE SPECIFICATIONS, ARE PRESENTED ONLY AS INFORMATION THAT IS AVAILABLE WHICH INDICATED CERTAIN CONDITIONS FOUND AND LIMITED TO THE EXACT LOCATIONS. SHALL NOT BE AN INDICATION OF CONDITIONS THAT MAY ACTUALLY BE DEVELOPED THROUGH THE PERIOD OF CONSTRUCTION. BIDDERS SHALL EXAMINE THE SITE OF THE WORK AND MAKE THEIR OWN DETERMINATION OF THE CHARACTER OF MATERIALS AND THE CONDITIONS TO BE ENCOUNTERED ON THE WORK, AND THEIR PROPOSAL SHALL BE BASED UPON THEIR OWN INVESTIGATIONS. THE OWNER AND ENGINEER SHALL NOT BE HELD RESPONSIBLE FOR MATERIALS FOUND TO EXIST BETWEEN THE ATTACHED DATA ABOVE REFERRED TO AND ACTUAL FIELD CONDITIONS THAT DEVELOP THROUGH THE PERIOD OF CONSTRUCTION.  
 B. WHERE EXISTING GRADES, UTILITY LINES AND SUBSTRUCTURES ARE SHOWN ON THE DRAWINGS, THE OWNER AND ENGINEER ASSUME NO RESPONSIBILITY FOR CORRECTNESS OF EXISTING CONDITIONS INDICATED. THE CONTRACTOR SHALL ASCERTAIN EXACT LOCATIONS OF UTILITIES AND SUBSTRUCTURES THAT MAY BE AFFECTED BY THIS PROJECT, AND SHALL BE RESPONSIBLE FOR ANY DAMAGE OR INJURY THAT MAY RESULT FROM WORKING ON OR NEAR THOSE UTILITIES, SUBSTRUCTURES WHICH ARE NOT TO BE REMOVED OR DEMOLISHED.  
 C. THE CONTRACTOR SHALL MAKE HIS OWN DEDUCTIONS OF THE SUBSURFACE CONDITIONS WHICH MAY AFFECT METHODS OR COST OF CONSTRUCTION AND HE AGREES THAT HE WILL MAKE NO CLAIM FOR DAMAGES OR OTHER COMPENSATION EXCEPT SUCH AS ARE PROVIDED FOR IN THE AGREEMENT, SHOULD HE FIND CONDITIONS DURING THE PROGRESS OF THE WORK DIFFERENT FROM THOSE AS CALCULATED OR ANTICIPATED BY HIM.

1-04 BENCH MARKS AND MONUMENTS  
 A. MAINTAIN CAREFULLY EXISTING BENCH MARKS, MONUMENTS, AND OTHER REFERENCE POINTS IF DISTURBED OR DESTROYED, REPLACE AS DIRECTED.  
 1-05 JOB CONDITIONS  
 A. CONDITION OF PREMISES: ACCEPT SITE AS FOUND AND EXCAVATE, FILL, COMPACT, AND BACKFILL SITE AS HEREINAFTER SPECIFIED.

B. PROTECTION  
 1. EXISTING STRUCTURES AND PROPERTY: TAKE PRECAUTIONS TO GUARD AGAINST MOVEMENT OR SETTLEMENT OF ADJACENT STRUCTURES AND FACILITIES; PROVIDE AND PLACE BRACING OR SHORING AS NECESSARY OR PROPER IN CONNECTION THEREWITH; BE RESPONSIBLE FOR SAFETY AND SUPPORT OF SUCH STRUCTURES; BE LIABLE FOR ANY MOVEMENT OR SETTLEMENT, ANY DAMAGE OR INJURY CAUSED THEREBY OR RESULTING THEREFROM. IF AT ANY SAFETY OR ANY ADJACENT STRUCTURES APPEARS TO BE ENDANGERED, CEASE OPERATION, TAKE PRECAUTIONS TO SUPPORT SUCH STRUCTURES AND NOTIFY THE OWNER. RESUME OPERATIONS ONLY AFTER PERMISSION HAS BEEN CHANGED BY THE OWNER.  
 2. SIDEWALKS AND STREETS: TAKE PRECAUTIONS TO GUARD AGAINST MOVEMENT, SETTLEMENT OR COLLAPSE OF ANY SIDEWALKS, CURBS OR STREET PAVEMENTS ON ADJOINING SITES. TAKE PRECAUTIONS TO GUARD AGAINST MOVEMENT, SETTLEMENT OR COLLAPSE; REPAIR PROMPTLY SUCH DAMAGE WHEN SO ORDERED, INSTALL SUCH SHORING, INCLUDING SHEET PILING, AS MAY BE REQUIRED DURING EXCAVATION, TO PROTECT BANKS, ADJACENT PAVING, STRUCTURES AND UTILITIES.  
 3. RESPONSIBILITY: BE RESPONSIBLE FOR ANY DAMAGE TO EXISTING STRUCTURE AND EQUIPMENT AND FURNISHINGS HOUSED THEREIN WHICH ARE DUE DIRECTLY OR INDIRECTLY TO CONSTRUCTION OPERATIONS, EXCEPT WHERE REMOVAL IS NECESSITATED BY SITE GRADING OR LOCATION OF NEW BUILDING. USE EVERY POSSIBLE PRECAUTION TO PREVENT INJURIES TO LANDSCAPING, DRIVES, CURBS AND WALKS ON OR ADJACENT TO SITE OF THE WORK AND REPLACE, AT NO EXPENSE TO OWNER, ANY OF SUCH DESTROYED.

II. EXECUTION  
 2-01 GENERAL  
 A. ACCOMPLISH IN A MANNER THAT PROVIDES FOR THE SAFETY OF THE PUBLIC AND WORKMEN AND PROVIDE FOR THE PROTECTION OF ALL PROPERTY.  
 B. CONSTRUCTION: DO NOT CLOSE, OBSTRUCT OR STORE MATERIAL OR EQUIPMENT IN STREETS, SIDEWALKS, ALLEYS OR PASSAGEWAYS WITHOUT A PERMIT IN ACCORDANCE WITH LOCAL ORDINANCES, REGULATIONS AND CODES.  
 C. INTERFERE WITH OPERATIONS WITH MINIMUM INTERFERENCE WITH ROADS, STREETS, DRIVEWAYS, ALLEYS, SIDEWALKS AND OTHER FACILITIES.  
 D. PNEUMATIC TOOLS: WORK WITH PNEUMATIC OR VIBRATORY TOOLS WILL BE PERMITTED ONLY IN A MANNER WHICH CAUSES NO RELATED DAMAGES.  
 E. REMOVAL: UNLESS OTHERWISE NOTED OR SPECIFIED TO BE RELOCATED OR STORED, ALL MATERIALS REMOVED BECOME THE PROPERTY OF THE CONTRACTOR AND MUST BE REMOVED COMPLETELY AWAY FROM THE SITE BY HIM. DO NOT STORE OR PERMIT DEBRIS TO ACCUMULATE ON THE SITE.  
 F. TEMPORARY STRUCTURES: REMOVE ALL TEMPORARY STRUCTURES WHEN THEY ARE NO LONGER REQUIRED.  
 G. REPAIR: CLEAN UP, REPAIR OR REPLACE AT NO COST TO OWNER ALL PROPERTY DAMAGED BY REASON OF REQUIRED WORK. ALL PATCHWORK SHALL MATCH EXISTING AND BE PERFORMED IN A NEAT AND WORKMANLIKE MANNER BY CRAFTSMEN SKILLED IN THE TRADE INVOLVED. IN NEWLY GRADED AREAS TAKE EVERY PRECAUTION AND TEMPORARY MEASURE NECESSARY, TO PREVENT DAMAGE FROM EROSION OF FRESHLY GRADED AREA, WHERE ANY SETTLEMENT OR WASHING MAY OCCUR PRIOR TO ACCEPTANCE OF THE WORK, REPAIR AND RE-ESTABLISH GRADES TO THE REQUIRED ELEVATIONS AND SLOPES AT NO ADDITIONAL COST TO THE OWNER. THIS APPLIES TO DAMAGE TO THE NEWLY GRADED AREAS WITHIN THE CONSTRUCTION LIMITS AND DAMAGE TO ADJACENT PROPERTIES BY ERODED MATERIAL.

2-02 LOCATIONS AND ELEVATIONS  
 A. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL SURVEYS, MEASUREMENTS AND LAYOUTS REQUIRED FOR PROPER EXECUTION OF THE WORK. LAY OUT LINES AND GRADES FROM EXISTING SURVEY CONTROL SYSTEM AND AS SHOWN ON DRAWINGS.

2-03 CLEARING AND GRUBBING  
 A. WITHIN LIMITS OF AREAS DESIGNATED FOR GRADING AND SITE CONSTRUCTION WORK, REMOVE TREES, BRUSH, STUMPS, WOOD, DEBRIS AND OTHER DELETERIOUS MATERIALS NOT REQUIRED TO REMAIN AS PART OF FINISHED WORK.  
 B. REMOVE ALL GRASS, PLANTS, VEGETATION AND ORGANIC MATERIAL FROM SAME AREA.

2-04 STRIPPING  
 A. STRIP ALL TOPSOIL ORGANIC MATERIAL SURFACE LITTER, RUBBLE AND OVERBURDEN FOR ENTIRE DEPTH OF ROOT SYSTEM OF GRASS OR OTHER VEGETATION OVER THE LIMITS OF CONSTRUCTION.  
 B. STOCKPILE TOPSOIL ON SITE WHERE DIRECTED.

2-05 EXCAVATION  
 A. BEGIN EXCAVATION AFTER STRIPPING, CLEARING AND GRUBBING WHERE APPLICABLE HAS BEEN COMPLETED.  
 B. EXCAVATE TO GRADES REQUIRED TO ACCOMMODATE THE PROPOSED CONSTRUCTION. DEWATER AS NEEDED.  
 C. REMOVE "UNSATISFACTORY MATERIALS" ENCOUNTERED FROM THE BUILDING AREAS, AND OTHER NON-LANDSCAPED AREAS.  
 D. EXCAVATE IN SUCH A MANNER THAT QUICK AND EFFICIENT DRAINAGE OF STORMWATER WILL BE AFFECTED.  
 E. CLASSIFY EXCAVATED MATERIALS AND STOCKPILE SEPARATELY SUITABLE SOILS FOR USE AS BACKFILL MATERIALS. IF SUFFICIENT QUANTITIES OF EXCAVATED MATERIALS MEETING REQUIREMENTS FOR BACKFILL ARE NOT AVAILABLE ON SITE, PROVIDE MATERIALS MEETING THESE REQUIREMENTS.  
 F. STOCKPILE EXCAVATED MATERIAL SUITABLE FOR USE AS FILL AND BACKFILL.

2-06 FILLING, BACKFILLING AND COMPACTION.  
 A. THE WORK CONSISTS OF COMPACTION OF EXISTING EARTH (EXCLUDE ROCK), SURFACES AFTER EXCAVATION, FILLING AND COMPACTION OF SAID AREA TO LEVELS REQUIRED WITH SUITABLE BACKFILL MATERIAL.  
 B. MATERIALS: "SATISFACTORY FILL MATERIALS" AASHTO CLASSIFICATION A-3 OR GREATER SHALL BE USED IN FILLS AND BACKFILLS.  
 C. FILLING AND BACKFILLING: PLACE "SATISFACTORY FILL MATERIAL" IN HORIZONTAL LAYERS NOT EXCEEDING 6 INCHES IN LOOSE DEPTH. COMPACT AS SPECIFIED HEREIN NO MATERIAL SHALL BE PLACED ON SURFACES THAT ARE MUDDY.  
 D. COMPACTION: COMPACTION SHALL BE WITH EQUIPMENT SUITED TO SOIL BEING COMPACTED. MOISTEN OR AERATE MATERIAL AS NECESSARY TO PROVIDE MOISTURE CONTENT THAT WILL READILY FACILITATE OBTAINING SPECIFIED COMPACTION WITH EQUIPMENT USED. COMPACT EACH LAYER TO NOT LESS THAN PERCENTAGE OF MAXIMUM DENSITY SPECIFIED BELOW DETERMINED IN ACCORDANCE WITH AASHTO T-180. INSURE THAT THE COMPACTION OF PREVIOUSLY PREPARED FILL AREAS HAS BEEN MAINTAINED

E. RECONDITIONING OF SUBGRADE: WHERE APPROVED COMPACTED SUBGRADES ARE DISTURBED BY THE CONTRACTOR'S SUBSEQUENT OPERATIONS OR ADVERSE WEATHER SUBGRADE SHALL BE SCARIFIED AND COMPACTED AS SPECIFIED HEREIN BEFORE TO REQUIRED DENSITY PRIOR TO FURTHER CONSTRUCTION THEREON. RE-COMPACTION OVER UNDERGROUND UTILITIES SHALL BE BY POWER-DRIVEN HAND TAMPERS.  
 F. COMPACTION REQUIREMENTS  
 1. FILL UNDER LAWS AND PLANTED: 95%  
 2. BELOW SLABS ON GRADE AND CONCRETE WALKS: 98%  
 3. UNDER PAVING PARKING AREAS: 98%  
 2-07 TESTING  
 A. THE CONTRACTOR WILL PROVIDE THE SERVICES OF A TESTING LABORATORY TO PERFORM SPECIFIED TESTS, INSPECTIONS, INSTRUMENTATION AND INSPECTION OF THE WORK.  
 B. TESTS OF MATERIALS SHALL BE AS FOLLOWS:  
 1. SOIL CLASSIFICATION: ONE TEST FROM EACH TYPE OF MATERIAL ENCOUNTERED AND OR PROPOSED TO BE USED.  
 2. LABORATORY TESTS FOR MOISTURE-CONTENT AND DENSITY ACCORDING TO AASHTO T-180. ONE TEST FOR EACH MATERIAL ENCOUNTERED AND/OR PROPOSED TO BE USED.  
 3. FIELD TESTS FOR MOISTURE CONTENT AND DENSITY: ONE TEST PER LAYER OF FILL PER 5,000 SQUARE FEET OF AREA.

**SUPPLEMENTAL SPECIFICATIONS GENERAL**  
 THE CONTRACTOR SHALL BECOME FAMILIAR WITH AND ADHERE TO THE SPECIFICATIONS AND STANDARDS OF THE UTILITY COMPANIES WHICH ARE SERVING THE PROJECT SITE. THE CONTRACTOR SHALL BECOME FAMILIAR WITH AND COMPLY WITH ALL SITE THIS PROJECT, DEVELOPMENT STANDARDS AND CODES OF THE REGULATORY AGENCIES ASSOCIATED WITH POTABLE WATER DISTRIBUTION/WASTEWATER COLLECTION INSTALLATION UNLESS OTHERWISE NOTED ON THE PLANS, THE STANDARDS AND SPECIFICATIONS OF THE ASSOCIATED UTILITY COMPANY SERVING THE PROJECT SITE SHALL BE ADHERED TO FOR ALL MATERIALS, INSTALLATION, TESTING, AND CERTIFICATION ACTIVITIES FOR ALL PUMP STATIONS, MAIN LINES, SERVICES, AND APPURTENANCES. IF STANDARDS AND SPECIFICATIONS ARE NOT AVAILABLE, THE CONTRACTOR SHALL CONFORM WITH THE LATEST STANDARDS AND SPECIFICATIONS ADOPTED BY MONROE COUNTY UTILITIES, LOCAL GOVERNMENTAL REGULATIONS, OR THE MANUFACTURERS RECOMMENDED INSTALLATION PROCEDURES, WHICHEVER IS SPECIFICALLY THE MOST RESTRICTIVE. A COPY OF THE MONROE COUNTY UTILITIES SPECIFICATIONS CAN BE REVIEWED AT THE OFFICE OF THE WEILER ENGINEERING CORPORATION.

**STORMWATER PIPE INSTALLATION AND MISCELLANEOUS EXCAVATIONS**  
 UNLESS OTHERWISE NOTED ON THE PLANS OR SPECIFICATIONS, THE CONTRACTOR SHALL PERFORM THE EXCAVATION, BEDDING, JOINTS, AND BACKFILLING OPERATIONS IN ACCORDANCE WITH THE APPLICABLE WATER/WASTEWATER INSTALLATION SPECIFICATIONS, LOCAL GOVERNMENTAL REGULATIONS OR STANDARDS, F.D.O.T. STANDARDS AND SPECIFICATIONS OR MANUFACTURER'S RECOMMENDED INSTALLATION PROCEDURES, WHICHEVER IS SPECIFICALLY THE MOST RESTRICTIVE.

**UNSUITABLE MATERIALS**  
 IF UNSUITABLE MATERIAL IS ENCOUNTERED WITHIN THE ROADWAY AREA AND/OR UTILITY AREAS IT SHALL BE REMOVED TO A DEPTH OF THREE (3) FEET BELOW THE SUB-BASE OR TRENCH BOTTOM AND SHALL BE BACKFILLED WITH THE A-3 MATERIAL OR BETTER WITH PLACEMENT AND COMPACTION METHODS IN ACCORDANCE WITH THE LATEST EDITION OF THE FLORIDA DEPARTMENT OF TRANSPORTATION'S STANDARD SPECIFICATIONS OR AS OTHERWISE NOTED ON THE PLANS. UNSUITABLE MATERIALS SHALL BE REMOVED FROM SITE, UNLESS THE ENGINEER APPROVES USE WITHIN LANDSCAPED AREAS.

**DEWATERING**  
 1.01 GENERAL  
 A. DEWATERING CONSISTS OF PERFORMING ALL WORK NECESSARY TO REMOVE SURFACE WATER AND/OR CONTROL THE GROUND WATER LEVELS AND HYDROSTATIC PRESSURES IN ORDER TO PERMIT ALL EXCAVATION AND CONSTRUCTION UNDER THIS CONTRACT TO BE PERFORMED IN THE DRY.  
 B. WORK OF THIS SECTION INCLUDES INSTALLATION, OPERATIONS, MAINTENANCE, SUPERVISION, SUPPLY, DISMANTLING, AND REMOVAL FROM THE SITE OF THE DEWATERING EQUIPMENT.  
 C. THE CONTRACTOR MUST FAMILIARIZE HIMSELF WITH THE POTENTIAL FOR EXCESSIVE RAINFALL, THE GROUND CONDITIONS, AND THE GROUND WATER CONDITIONS. GROUND WATER ELEVATION CAN FLUCTUATE. IT IS ANTICIPATED THAT ANY EXCAVATIONS MAY ENCOUNTER THE GROUND WATER TABLE.  
 D. DRAINAGE OF THE SITE: AT ALL TIMES THE CONTRACTOR SHALL MAINTAIN AND OPERATE ADEQUATE SURFACE DRAINAGE METHODS IN ORDER TO KEEP THE CONSTRUCTION SITE DRY AND IN SUCH CONDITION THAT PLACEMENT AND COMPACTION OF FILL MAY PROCEED UNHINDERED BY SATURATION OF THE AREA DURING CONSTRUCTION, THE SURFACE OF THE BACKFILL AREA SHALL BE LEFT IN SUCH CONDITION THAT PRECIPITATION AND/OR SURFACE WATER WILL RUN OFF WITHOUT PONDING.

1-02 METHOD  
 A. THE CONTROL OF ALL SURFACE AND SUBSURFACE WATER IS PART OF THE DEWATERING REQUIREMENTS. MAINTAIN ADEQUATE CONTROL SO THAT THE STABILITY OF EXCAVATED AND CONSTRUCTION SLOPES IS NOT ADVERSELY AFFECTED BY WATER. THAT EROSION IS CONTROLLED, AND THE FLOODING OF EXCAVATIONS OR DAMAGE TO STRUCTURES DOES NOT OCCUR, DRAIN SURFACE WATER AWAY FROM THE EXCAVATION.  
 B. DISPOSE OF ALL WATER REMOVED FROM THE EXCAVATION IN A MANNER THAT WILL NOT ENDANGER PUBLIC HEALTH, PROPERTY, OR PORTIONS OF THE WORK UNDER CONSTRUCTION OR COMPLETED. DISPOSE OF WATER IN A MANNER THAT WILL CAUSE NO INCONVENIENCE WHATSOEVER TO THE OWNER OR TO OTHERS ENGAGED IN WORK AT THE SITE.  
 C. DISPOSE OF WATER RESULTING FROM DEWATERING OPERATIONS IN ACCORDANCE WITH CITY, COUNTY, STATE AND FEDERAL REGULATIONS.  
 D. CONDUCT OPERATIONS SO THAT STORMWATER RUNOFF, SEDIMENT IS NOT DISCHARGED TO THE ADJACENT WATER BODIES, SEWERS, STREETS AND ADJACENT PROPERTIES  
 E. DEWATERING SYSTEM SHALL BE SO DESIGNED AS TO PREVENT REMOVAL OF SOIL FINES FROM THE SITE DURING THE DEWATERING OPERATION

**PORTLAND CEMENT CONCRETE**  
 1-01 QUALITY ASSURANCE  
 A. COMPLY WITH ACI STANDARDS RECOMMENDED PRACTICES FOR CONSTRUCTION OF CONCRETE PAVEMENTS AND CONCRETE BASES (ACI316, LATEST EDITION)  
 1-02 REFERENCE STANDARDS  
 A. THE FOLLOWING REFERENCE STANDARDS OF THE ISSUES LISTED BELOW BUT REFERRED TO THEREAFTER BY BASIC DESIGNATION ONLY, FORM A PART OF THIS SPECIFICATION TO THE EXTENT INDICATED BY THE REFERENCES THERE TO. TESTS SHALL BE PERFORMED IN ACCORDANCE WITH HEREINAFTER SPECIFIED STANDARDS.  
 1. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)  
 2. AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO) STANDARD.  
 3. FLORIDA DEPARTMENT OF TRANSPORTATION (FDOT) 2017 STANDARDS AND SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION SECTION 350 - "CEMENT CONCRETE PAVEMENT".  
 4. T-180 MOISTURE-DENSITY RELATIONS OF SOILS.

1-03 SUBMITTALS  
 THE CONTRACTOR SHALL SUBMIT TWO COPIES OF TEST REPORTS PREPARED BY AN INDEPENDENT TESTING LABORATORY AND CERTIFIED BY A PROFESSIONAL ENGINEER REGISTERED TO PRACTICE IN THE STATE OF FLORIDA. THESE REPORTS SHALL INDICATE ALL TESTS PERFORMED AND SHALL INCLUDE A CERTIFICATION STATEMENT OF COMPLIANCE WITH THE PROJECT SPECIFICATIONS. TESTS SHALL BE PERFORMED AS SPECIFIED UNDER THIS SECTION.  
 1. SUBMIT FOR REVIEW THE FOLLOWING:  
 A. CONCRETE DESIGN MIX AND PROVING FLEXURAL STRENGTH (MODULUS OF RUPTURE) TESTS  
 B. EXPANSION JOINT FILLER DATE  
 C. JOINT SEALER DATE  
 D. PROPOSED PAVING CONSTRUCTION PLAN WHICH SHALL SHOW THE CONCRETE PAVING JOINT TYPES AND LOCATIONS AND SHALL INCLUDE A STATEMENT OF PROPOSED SEQUENCE AND SCHEDULE OF PAVING OPERATIONS  
 E. RESULTS OF CONCRETE TESTS  
 F. RESULTS OF FIELD TESTS OF LBR AND COMPACTION OF STABILIZED SUBGRADE.

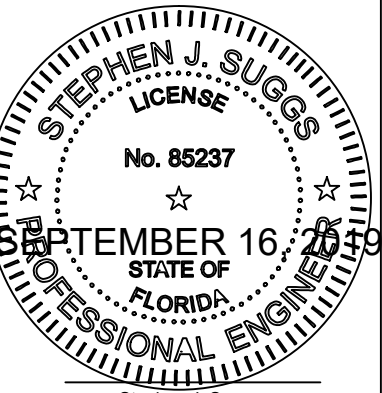
1-04 MATERIALS  
 A. STABILIZED SUBGRADE: PROVIDE 12 INCH STABILIZED SUBGRADE (LBR 40 MIN) COMPACTED TO A MINIMUM DENSITY OF 98% AS DETERMINED BY AASHTO T-180  
 B. CONCRETE: CONCRETE FOR CONCRETE PAVEMENT SHALL HAVE A COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS UNLESS NOTED OTHERWISE. A SLUMP RANGE BETWEEN 2 TO 4 INCHES AND A 28 DAY MODULUS OR RUPTURE OF 650 PSI AS DETERMINED BY THE REQUIREMENTS OF PARAGRAPH TESTING SPECIFIED HEREINAFTER.  
 C. JOINT SEALER: JOINT SEALING SHALL CONFORM TO FEDERAL SPECIFICATIONS SS-S401 OR SS-S-2009 (COLD APPLIED)  
 1-05 EXECUTION  
 A. COMPLY WITH AC STANDARD 316-74 AND SECTION 350, FDOT STANDARDS AND SPECIFICATIONS, UNLESS OTHERWISE SPECIFIED HEREIN.  
 B. FINAL GRADING: ALL CONCRETE PAVEMENT SHALL HAVE A MAXIMUM DEVIATION OF 1/8 INCH (PLUS/MINUS) FROM THE SPECIFIED SURFACE PLANE AND PLAN GRADES.  
 C. THE SURFACE FINISH SHALL BE APPROVED BY THE OWNER OR HIS REPRESENTATIVE. IN GENERAL THE TEXTURE IS OF A MEDIUM BROOM FINISH AFTER FLOATING.  
 D. JOINTS  
 1. CONTRACTION JOINTS INDICATED ON DRAWINGS, OR AS REQUIRED, SHALL BE PLACED PERPENDICULAR TO THE FINISH GRADE OF THE CONCRETE. JOINTS SHALL BE CUT TO A DEPTH OF 1/4 OF THE SLAB THICKNESS BY CUTTING TOOLS WITH A MINIMUM 1/4 INCH RADIUS OR BY SAWING WITH A BLADE PRODUCING A CUT NOT LESS THAN 1/8 INCH IN WIDTH. SAW JOINTS WITHIN 4 TO 6 HOURS OF CONCRETE PLACEMENT.  
 2. EXPANSION JOINTS SHALL BE PLACED WHERE INDICATED ON DRAWINGS, OR AS REQUIRED, USING 1/2 INCH THICK PREFORMED EXPANSION JOINT MATERIAL ANCHOR WITH APPROVED DEVICES TO PREVENT DISPLACEMENT DURING PLACEMENT AND FINISHING. EDGES SHALL BE ROUNDED WITH AN EDGING TOOL. JOINTS SHALL BE FULL DEPTH OF CONCRETE EXCEPT THAT TOP EDGES SHALL BE 1/2 INCH BELOW THE FINISH CONCRETE SURFACE. EXPANSION JOINTS SHALL BE SEALED TO THE SURFACE BY FILLING WITH JOINT SEALING COMPOUND. JOINTS SHALL BE CLEAN AND DRY BEFORE SEALING COMPOUND IS PUT IN PLACE.  
 3. CONSTRUCTION JOINTS ARE TO BE USED AT CONTRACTION JOINT LOCATIONS TO STOP CONCRETE POURS.  
 E. CURING: CONCRETE SHALL BE CURED BY PROTECTING IT AGAINST LOSS OF MOISTURE AND MECHANICAL INJURY FOR AT LEAST THREE DAYS AFTER PLACEMENT. A PIGMENTED LIQUID CURING MEMBRANE SHALL BE APPLIED IMMEDIATELY AFTER FINISHING, OPERATION AT THE RATE OF ONE GALLON TO NOT MORE THAN 200 SQUARE FEET.  
 F. CLEANING AND SEALING JOINTS: JOINTS SHALL BE FILLED WITH JOINT-SEALING MATERIAL NO LESS THAN 8 HOURS AND WITHIN 2 WEEKS AFTER JOINTS ARE BUT. JUST PRIOR TO SEALING, EACH JOINT SHALL BE THOROUGHLY CLEANED OF ALL FOREIGN MATERIAL INCLUDING ANY MEMBRANE CURING COMPOUND.  
 G. TESTING: LABORATORY AND FIELD TESTING SHALL BE AT THE CONTRACTOR'S EXPENSE. IN ADDITION, ALL RETESTING SHALL BE DONE AT CONTRACTOR'S EXPENSE.  
 1. DESIGN MIXES AND TESTING REQUIREMENTS FOR THE CONCRETE PAVEMENT SHALL BE AS FOLLOWS:  
 A. FLEXURAL STRENGTH TESTS OF CONCRETE AS BASIS FOR DESIGN  
 B. SLUMP, MODULES OF RUPTURE AND 7-AND 20 DAY COMPRESSIVE STRENGTH TESTS SHALL BE PERFORMED ON SAMPLES TAKEN AT THE SITE AT A FREQUENCY OF TWO PER ACRE.  
 2. WHERE THE FLEXURAL STRENGTH OF THE CONCRETE IS SPECIFIED, MAKE ONE STRENGTH TEST AND ONE FLEXURAL TEST FOLLOWING ASTM C192 AND ASTM C79 FOR EACH 100 CUBIC YARDS OR FRACTION THEREOF PLACED PER DAY. NUMBER OF CYLINDERS SHALL BE THREE FOR STRENGTH TEST AND THREE FOR FLEXURAL TEST. TEST ONE AT THREE DAYS, ONE AT SEVEN DAYS AND ONE AT 28 DAYS

PORTLAND CEMENT CONCRETE - CONCRETE SHALL BE TESTED FOR THE FOLLOWING PARAMETERS: SLUMP, MODULES OF RUPTURE, AND 7 AND 28 DAY COMPRESSIVE STRENGTH TESTS SHALL BE PERFORMED ON SAMPLES TAKEN AT THE SITE AT A FREQUENCY OF TWO PER ACRE. A PROFESSIONAL ENGINEER'S CERTIFICATION OF COMPLIANCE SHALL BE PROVIDED BY THE TESTING LAB.  
 RETENTION/DETENTION FACILITIES - IN ADDITION WITHIN THE PROJECT, THE CONTRACTOR SHALL COORDINATE WITH THE ENGINEER AND PERFORM A DRAW DOWN AND CAPACITY TEST OF THE FACILITIES. THE CONTRACTOR SHALL PROVIDE SUFFICIENT WATER AND ACCEPTABLE MEANS TO MEASURE THE WATER VOLUMES PROVIDED, IF REQUIRED BY THE ENGINEER, IF A FILTRATION SYSTEM IS INCLUDED WITHIN THE PROJECT, THE FILTER MEDIA SHALL BE TESTED FOR COMPLIANCE WITH ALL CURRENT SPECIFICATIONS OF THE WATER MANAGEMENT DISTRICT. A PROFESSIONAL ENGINEER'S CERTIFICATION OF COMPLIANCE SHALL BE PROVIDED BY THE TESTING LAB.

IN ADDITION TO THE ENVIRONMENTAL PROTECTION DURING CONSTRUCTION SPECIFICATIONS, THE CONTRACTOR SHALL PERFORM THE FOLLOWING IN THE ORDER LISTED:  
 1. PRIOR TO COMMENCEMENT, PROVIDE NOTIFICATION TO THE LOCAL WATER MANAGEMENT DISTRICT AND LOCAL GOVERNMENT OFFICES.  
 2. ERECT A TURBIDITY SCREEN ON ANY DOWNSTREAM SYSTEM WHICH RECEIVES RUNOFF FROM THE PROJECT. INSTALL OUTFALL CONTROL STRUCTURE AND FILTRATION SYSTEM IF INCLUDED  
 3. PROVIDE A TEMPORARY FILTER CLOTH COVERED WITH GRAVEL OVER ANY PROPOSED FILTERS  
 4. INSTALL A TEMPORARY TURBIDITY SCREEN AT ALL CONTROL STRUCTURES.  
 5. CONSTRUCT A TEMPORARY PERIMETER BERM AS NECESSARY TO DIRECT ALL RUNOFF WITHIN ANY AREA PLANNED FOR CLEARING.  
 6. MAINTAIN FILTER DURING CONSTRUCTION TO PROVIDE CONTINUOUS OPERATION.  
 7. UPON PERFORMING FINAL GRADING, THE CONTRACTOR SHALL REMOVE ALL SILTS, CLAYS AND OTHER DELETERIOUS MATERIAL FROM THE BOTTOM OF ALL STORMWATER MANAGEMENT AREAS PRIOR TO GRASSING.  
 8. AFTER ACHIEVING A NON-ERODIBLE COVER OF GRASS, REMOVE TEMPORARY FILTER CLOTH AND GRAVEL OVER FILTERS AND REPLACE WITH NEW FILTER CLOTH AND COVER MATERIAL IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS.  
 9. NOTIFY THE OWNER FOR FINAL INSPECTION.  
 10. UPON FINAL APPROVAL FROM OWNER, REMOVE ALL TEMPORARY EROSION AND SEDIMENT CONTROL FACILITIES.

**PIPING**  
 A. ALL VALVE OPERATORS AND HAND WHEELS, ETC. SHALL FACE AND BE ACCESSIBLE TO PLATFORMS OR OPERATING AREAS. THE CONTRACTOR IS RESPONSIBLE FOR PROPER ORIENTATION TO MEET THIS REQUIREMENT.  
 B. PIPING PLANS DO NOT PURPORT TO SHOW ALL FITTINGS, SPECIALS, ETC., WHICH MAY BE NECESSARY TO INSTALL A FUNCTIONING SYSTEM.  
 INSTALL EXTRA PIPE FITTINGS TO AFFORD PROPER PIPE CLEARANCES AND ALIGNMENT WHERE NECESSARY AT NO ADDITIONAL COST TO THE OWNER.  
 C. ALL HYDRAULIC STRUCTURES SHALL HAVE WALL PIPES AT PIPE PENETRATIONS.  
 D. ALL BENDS, TEES, PLUGS, ETC. ON PRESSURE MAINS SHALL BE RESTRAINED IN ACCORDANCE WITH SPECIFICATIONS.  
 E. ALL TRENCHES FOR NEW PIPING AND CONDUIT SHALL BE BACKFILLED WITH SUITABLE MATERIAL AND BE THOROUGHLY COMPACTED, UNLESS OTHERWISE SPECIFIED.  
 F. WHERE DRAINING AND CLEANING OF EXISTING TANKS IS REQUIRED TO PERFORM WORK UNDER THIS CONTRACT, IT WILL BE THE CONTRACTOR'S RESPONSIBILITY TO OPERATE ALL VALVES, GATES, AND PUMPS TO ACCOMPLISH BY-PASS OF THE UNIT, TO DRAIN WASTEWATER BACK TO HEAD OF PLANT AND TO CLEAN AND DISPOSE OF ALL SLUDGE REMOVED.  
 G. ALL EXISTING EQUIPMENT, PIPING, VALVES AND OTHER ITEMS REMOVED AND DEEMED REUSEABLE DURING CONSTRUCTION OPERATIONS SHALL REMAIN THE PROPERTY OF THE OWNER AND SHALL BE STORED ON THE SITE IN THE LOCATION DESIGNATED BY THE OWNER.  
 H. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING FLOWS THROUGH EXISTING PIPING AND STRUCTURES AND DIVERSION OF FLOWS AS NECESSARY DURING CONSTRUCTION UNDER THIS CONTRACT, TO INSURE CONTINUATION OF PLANT OPERATION WITHOUT INTERRUPTION. ALL WORK WHICH AFFECTS PLANT OPERATIONS SHALL BE COORDINATED AND SCHEDULED TO THE SATISFACTION OF PLANT PERSONNEL PRIOR TO BEGINNING. ALL WORK ON EXISTING SYSTEM SHALL BE COORDINATED A MINIMUM OF 72 HOURS PRIOR WITH THE OWNER.  
 I. DIMENSION, ELEVATIONS, AND LOCATIONS SHOWN ON THESE DRAWINGS FOR EXISTING STRUCTURES, PIPING, ETC., MAY BE FROM RECORD DRAWINGS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY ALL INFORMATION PRIOR TO BEGINNING HIS CONSTRUCTION OPERATIONS IN EACH AREA AND AT NO ADDITIONAL COST TO THE OWNER. MAKE ALL NECESSARY ADJUSTMENTS TO PERFORM THE INTENT OF WORK UNDER THIS CONTRACT.

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Stephen J. Suggs  
 Professional Engineer  
 State of Florida  
 Registration No. 85237

GENERAL NOTES  
 COLLEGE RD. FORCE MAIN  
 KWRU

WEILER ENGINEERING CORPORATION  
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Date Issued:	AS STAMPED		

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### ABBREVIATIONS

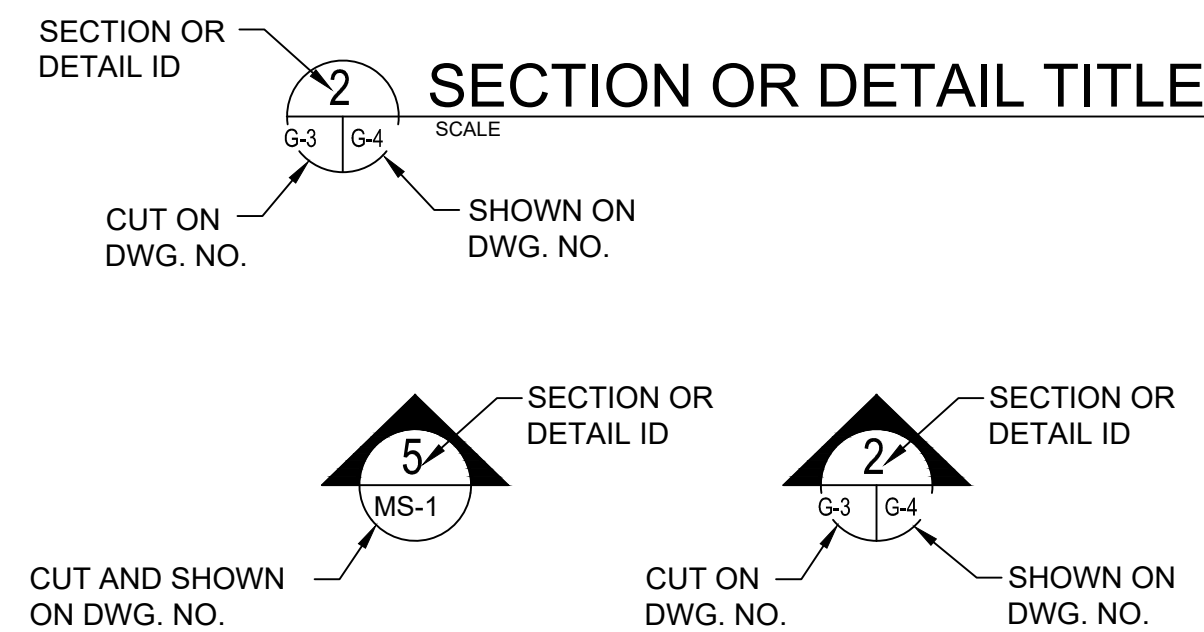
<b>A</b> A/C Air Conditioner	<b>E</b> EFF Effluent	<b>L</b> LF Linear Foot	<b>R</b> REF Reference
ACP Asbestos Cement Pipe	EL Elevation	LH Left Hand	REQD Required
AL, ALUM Aluminum	ELEV Elevator	LWFC Lightweight Concrete Fill	REV Revision
ALT Alternate	EMER Emergency	LWL Low Water Level	RH Right Hand
AMP Ampere	EO Electrically Operated	<b>M</b> MAX Maximum	RM Room
ARV Air Release Valve	EOP Edge Of Pavement	MBR Membrane Batch Reactor	RPM Revolution Per Minute
ASB Asbestos	EQ Equal or Equalization	MCC Motor Control Center	RFG Refridgerator
AUX Auxiliary	EQUIP Equipment	MECH Mechanical	<b>S</b> S South
AWL Average Water Level	EW Each Way	MEMB Membrane	SBR Sequencing Batch Reactor
<b>B</b> BFP Backflow Preventer	EXP Expansion	MFM Magnetic Flow Meter	SCH Schedule
BFV Butterfly Valve	<b>F</b> FE Flow Element or Fire Extinguisher	MG Million Gallons	SECT Section
BHP Brake Horsepower	FFE Finished Floor Elevation	MGD Million Gallons Per Day	SD Storm Drain
BL, R Baseline	FH Fire Hydrant	MH Manhole	SF Square Feet
BLDGB Building	FIN Finished	MIN Minute or Minimum	SHWR Shower
BM Bench Mark	FLG Flange	MISC Miscellaneous	SOV Solenoid Valve
BPS Booster Pump Station	FLM Flow Meter	MJ Mechanical Joint	SPEC Specification
BPV Back Pressure Valve	FM Force Main	MM Millimeter	SS Stainless Steel
BSMT Basement	FPS Feet Per Second	MO Motor Operated	STO Storage
BV Ball Valve	FRP Fiber Reinforced Plastic	MSL Mean Sea Level	STD Standard
BYP Bypass	FT Foot	MW Megawatt or Monitoring Well	SWW Storm Water Well
<b>C</b> CC Center to Center	FTG Footing	MWL Maximum Water Level	SYM Symbol
CB Catch Basin	<b>G</b> GA Gauge	<b>N</b> N North	<b>T</b> T&P Time and Pressure
CA Compressed Air	GAL Gallon	NA Not Applicable	TB Thrust Block
CCB Chlorine Contact Basin	GALV Galvanized	NG Natural Gas	TDH Total Dynamic Head
CEM Cement	GLV Globe Valve	NO, # Number	TEMP Temperature
CF Cubic Foot	GPD Gallons Per Day	NOM Nominal	TOP Top of Pavement
CFS Cubic Feet Per Second	GPH Gallons Per Hour	NPT National Pipe Thread	TOS Top of Slab
CFM Cubic Feet Per Minute	GPM Gallons Per Minute	NPW Non-Potable Water	TOW Top of Wall
CI Cast Iron	GV Gate Valve	NTS Not To Scale	TYP Typical
CIP Cast Iron Pipe	<b>H</b> HB Hose Bibb	<b>O</b> OC On Center	<b>U</b> UON Unless Otherwise Noted
CIPC Cast-in-Place Concrete	HDWR Hardware	OD Outside Diameter	<b>V</b> V Volt
CL, Q Centerline	HORZ Horizontal	ODC Odor Control	VAC Vacuum
CLR Clear	HP Horsepower	<b>P</b> PC Porous Concrete	VAL VALVE
CMU Concrete Masonry Unit	HR Handrail	PD Plant Drain	VAT Vinyl Asbestos Tile
CO Clean Out	HT Height	PG Pressure Gauge	VCP Vitrified Clay Pipe
COL Column	HWL High Water Level	PI Plant Influent	VCT Vitrified Clay Tile
CONC Concrete	HZ Hertz	PL, R Property Line	VEL Velocity
CONT Continuous	<b>I</b> ID Inside Diameter	PLC Programmable Logic Center	VIF Verify In Field
CTR Center	IN, " Inch	PLV Plug Valve	VERT Vertical
CV Check Valve	INF Influent	PPS Plant Pump Station	VOL Volume
CWR Cold Water Return	INV Invert	PRDV Pressure Reducing Valve	<b>W</b> W Watt or West
CWS Cold Water Supply	IPF Iron Pin Found	PRIM Primary	W/D Washer / Dryer
<b>D</b> DEG, ° Degree	IPS Injection Pump Station	PRV Pressure Relief Valve	WAS Waste Activated Sludge
DI Ductile Iron	IW Injection Well	PSS Pressure Safty Switch	WS Waste Sludge or Water Stop
DIA, Ø Diameter	<b>J</b> JCT Junction	PSW Pressure Switch	WT Weight
DIP Ductile Iron Pipe	<b>K</b> KG Kilogram	PVC Polyvinyl Chloride	WW Wastewater
DN Down	KSI Kips Per Square Inch	PVMT Pavement	WWF Welded Wire Fabric
DO Dissolved Oxygen	KGV Knife Gate Valve	PW Potable Water	WWTP Wastewater Treatment Plant
DS Digested Sludge	KW Kilowatt	<b>Q</b> QTY Quantity	<b>Y</b> YH Yard Hydrant
<b>E</b> E East	<b>L</b> LAB Laboratory	<b>R</b> RAD, R Radius	YR Year
ECC Eccentric	LB Pound	RC Reinforced Concrete	
EF Each Face		RCC Roller Compacted Concrete	

### GENERAL SYMBOL LEGEND

— 303 —	EXISTING CONTOUR	— OHE —	OVERHEAD ELECTRIC
— 303 —	FINISHED CONTOUR	⊗ PP	EXISTING POWER LINE
⊕ 20.5	SPOT ELEVATION	— — —	NEW PROCESS PIPING
⊗	ELEVATION DESIGNATION	— — —	NEW PIPING (UNDERGROUND)
⊕	HOSE BIBB	— — —	EXISTING PIPING
— — —	EXISTING ELECTRICAL	● — — —	YARD HYDRANT - PROPOSED
— x — x —	EXISTING FENCE	⊕ — — —	YARD HYDRANT - EXISTING
— x — x —	NEW FENCE	● — — —	FIRE HYDRANT - PROPOSED
— r —	PROPERTY LINE	⊕ — — —	FIRE HYDRANT - EXISTING
— RW —	RIGHT-OF-WAY LINE	CO ●	CLEAN OUT - PROPOSED
⊕	BALL VALVE	⊕ 08-MO-15	VALVE DESIGNATION
⊕	REDUCER	⊕ 08-0LS-2	EQUIPMENT LABEL
⊕	CHECK VALVE	⊕	FIELD MOUNTED
⊕	GATE VALVE	⊕	FIELD PANEL MOUNTED
⊕	PLUG VALVE	⊕	ACTUATED VALVE
⊕	BALANCING VALVE	⊕	INTERLOCK
⊕	BUTTERFLY VALVE	⊕	PUMP
⊕	ISOLATION VALVE	⊕	INSTRUMENT (FIELD MTD.)
⊕	SOLENOID VALVE	⊕	INSTRUMENT (MTD. IN PRIMARY LOCATION)
⊕	PNEUMATIC CONTROL VALVE	⊕	SCADA
⊕	PRESSURE REGULATING VALVE	⊕	FLOAT SWITCH
⊕	SURGE RELIEF VALVE	⊕	PILOT LIGHT
⊕	AIR RELEASE VALVE	⊕	
⊕	NEEDLE VALVE	⊕	NEW ASPHALT PAVEMENT
⊕	MOTOR	⊕	
— — —	ELECTRICAL SIGNAL	⊕	EXISTING STRUCTURE
⊕	FLOW METER	⊕	NEW STRUCTURE
— — —	CITY WATER LINE (POTABLE)		
— — —	PLANT WATER LINE		
— — —	NATURAL GAS LINE		
— — —	EXISTING GAS LINE		
— — —	EXISTING CHLORINE		
— — —	EXISTING SANITARY SEWER LINE		
⊕	LIQUID CALIBRATION TUBE		

NOTE:  
LEGEND APPLIES WHERE INADEQUATE DESCRIPTION AVAILABLE. VERIFY CONFLICTS WITH ENGINEER.

### SECTION CUTS & DETAIL CALLOUTS



Design:	JC-S, SS, ERC
Drawn:	JC-S
AS NOTED	AS NOTED
Job No:	18013.006
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 BE #6656

### LEGEND & SYMBOLS COLLEGE RD. FORCE MAIN KWRU

Revisions	Description

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SEPTEMBER 16, 2019

STEPHEN J. SUGGS  
 LICENSE  
 No. 85237  
 PROFESSIONAL ENGINEER  
 STATE OF FLORIDA  
 Registration No. 85237

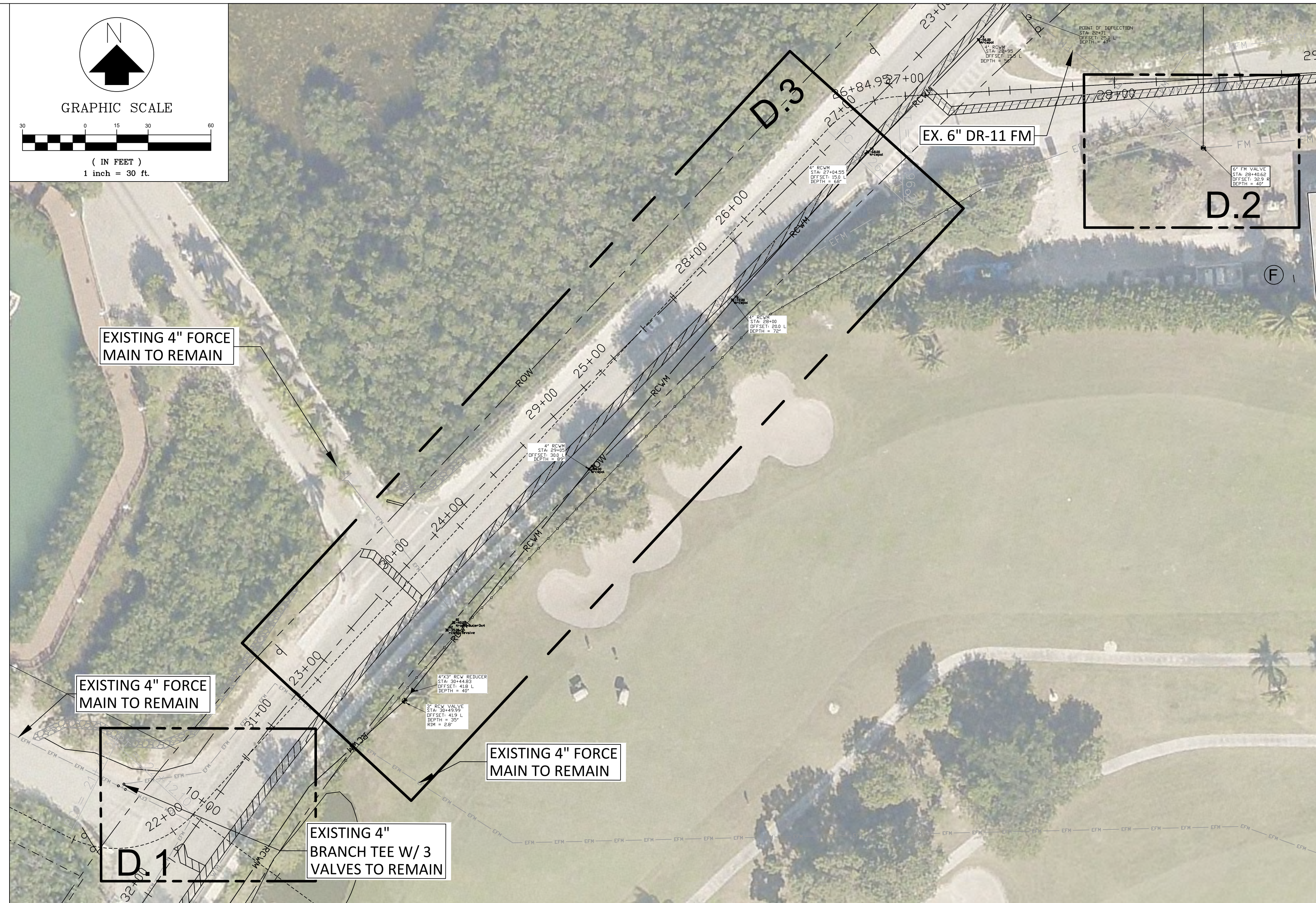
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**DETAIL 1**  
**SUNSET MARINA RD TO COLLEGE RD**  
**SCALE: 1'=10'**



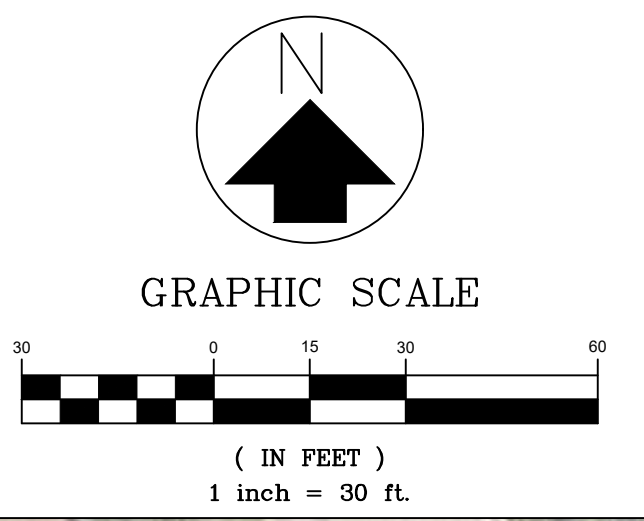
**DETAIL 2**  
**COLLEGE RD TO KOKENZIE RD**  
**SCALE: 1'=10'**



**EXISTING CONDITIONS**



**DETAIL 3**  
**COLLEGE RD**  
**SCALE: 1'=20'**



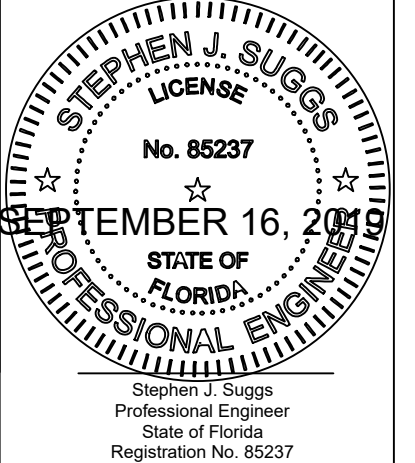
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 941.505.1700  
 BE #6556

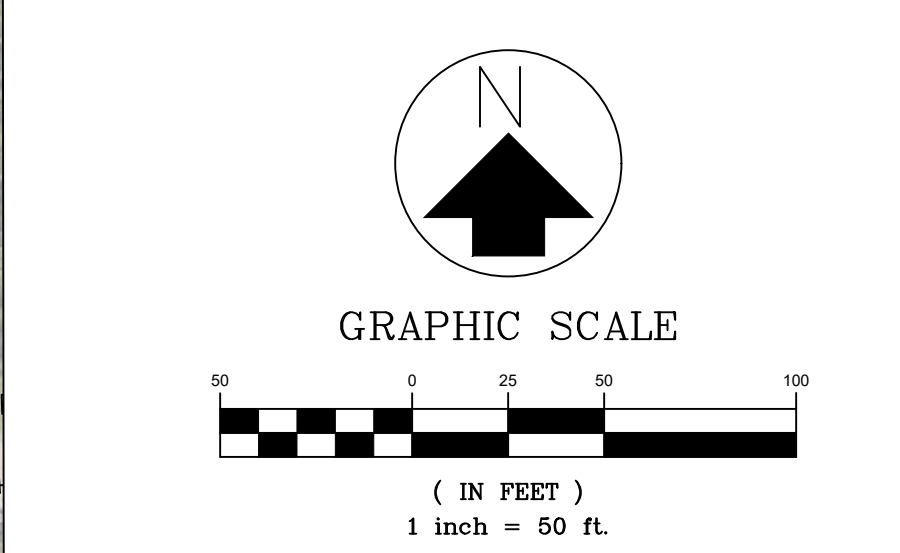
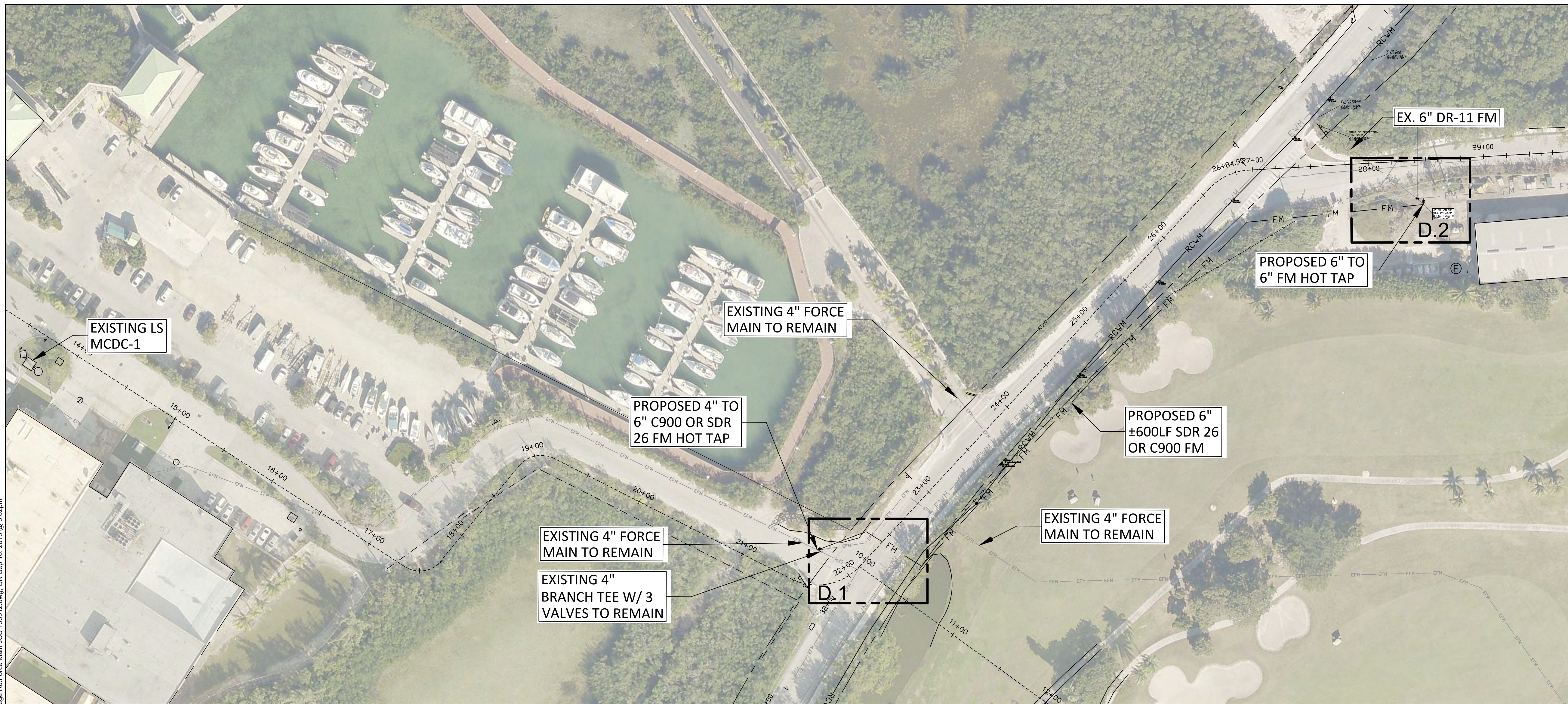
**EXISTING CONDITIONS**  
**COLLEGE RD FORCE MAIN**  
**KWRU**

Revisions	Description

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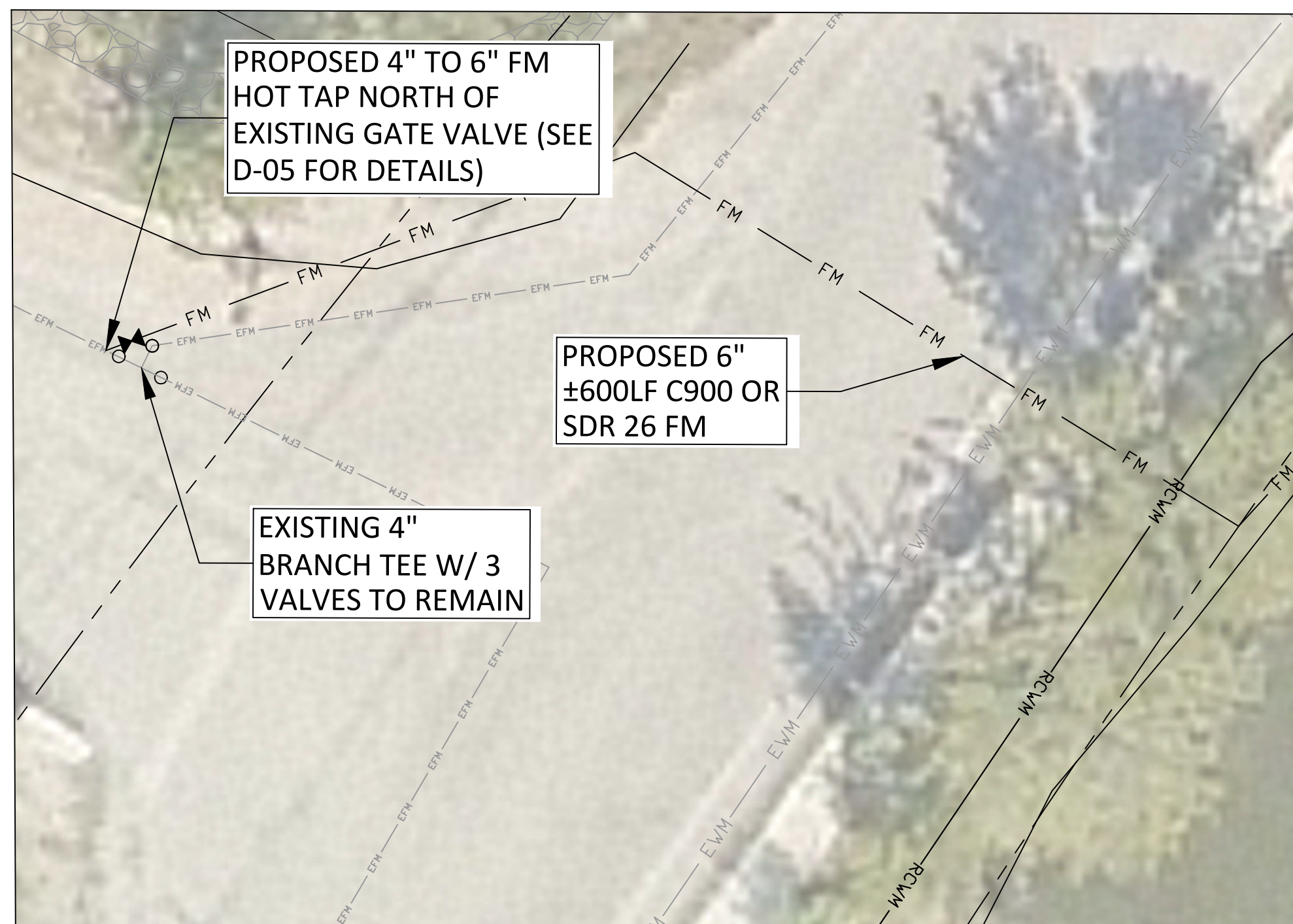
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- GENERAL NOTES:**
- CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UTILITIES PRIOR TO CONSTRUCTION. THE EXISTING UTILITIES SHOWN HEREON ARE TO THE BEST OF THE ENGINEERS/SURVEYORS ABILITIES. CONTRACTOR IS TO RECORD/REPORT ANY UTILITIES ENCOUNTERED AND/OR LOCATED. ANY LOCATED UTILITIES SHALL BE SHOWN IN THE RED-LINES AND AS-BUILT DRAWINGS.
  - CONTRACTOR TO ARRANGE FIELD MEETING WITH ENGINEER OF RECORD PRIOR TO EXPOSING CONNECTION POINT AND TO REVIEW LOCATIONS OF PROPOSED IMPROVEMENTS BEFORE ANY CONSTRUCTION BEGINS.
  - ALL DISTURBED AREAS ARE TO BE RESTORED TO MATCH EXISTING GROUND COVER.
  - DAMAGE OF PAVEMENT AND/OR SOD OUTSIDE OF ACTUAL WORK AREAS SHALL BE REPAIRED AT CONTRACTORS EXPENSE.
  - LOCATION OF PROPOSED VALVES ARE TO BE FIELD VERIFIED PRIOR TO INSTALLATION OF MAIN AND FITTINGS.
  - THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING MOT THROUGHOUT THE PROJECT DURATION.
  - PROPOSED FORCE MAIN PIPE SHALL BE C900 OR SDR 26 DEPENDING ON EXISTING SITE PIPE MATERIAL. CONTRACTOR SHALL VERIFY EXISTING 4" AND 6" FM MATERIAL AT TAP IN LOCATION AND PROVIDE NECESSARY ADAPTERS.
  - CONTRACTOR SHALL VERIFY AND ENSURE THAT PROPOSED PIPING STAYS IN THE BOUNDARIES OF THE RIGHT OF WAY AND OR EASEMENT.

**OBJECTIVE:**  
OBJECTIVE IS TO INSTALL A 6" FORCE MAIN THAT SHALL DIVERT FLOW FROM THE EXISTING MDCD-1 LS 4" FORCE MAIN INTO THE EXISTING 6" FORCE MAIN ON KOKENZIE RD.

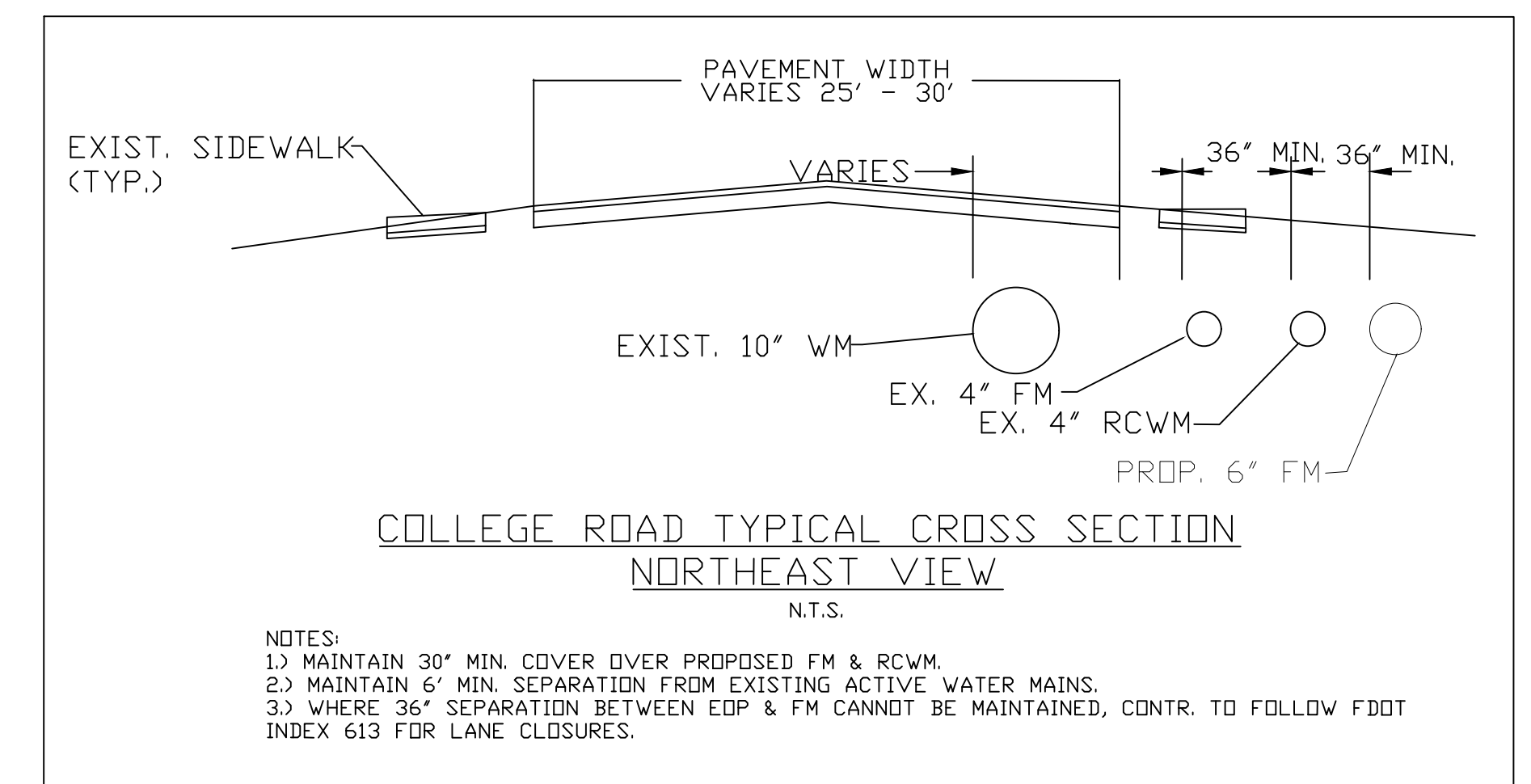
# SITE PLAN



**DETAIL 1**  
**SUNSET MARINA RD TO COLLEGE RD**  
**SCALE: 1'=10'**



**DETAIL 2**  
**COLLEGE RD TO KOKENZIE RD**  
**SCALE: 1'=10'**



**NOTES:**  
1) MAINTAIN 30" MIN. COVER OVER PROPOSED FM & RCWM.  
2) MAINTAIN 6" MIN. SEPARATION FROM EXISTING ACTIVE WATER MAINS.  
3) WHERE 36" SEPARATION BETWEEN EOP & FM CANNOT BE MAINTAINED, CONTR. TO FOLLOW FDOT INDEX 613 FOR LANE CLOSURES.

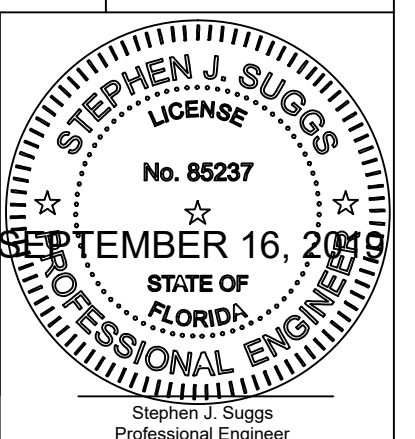
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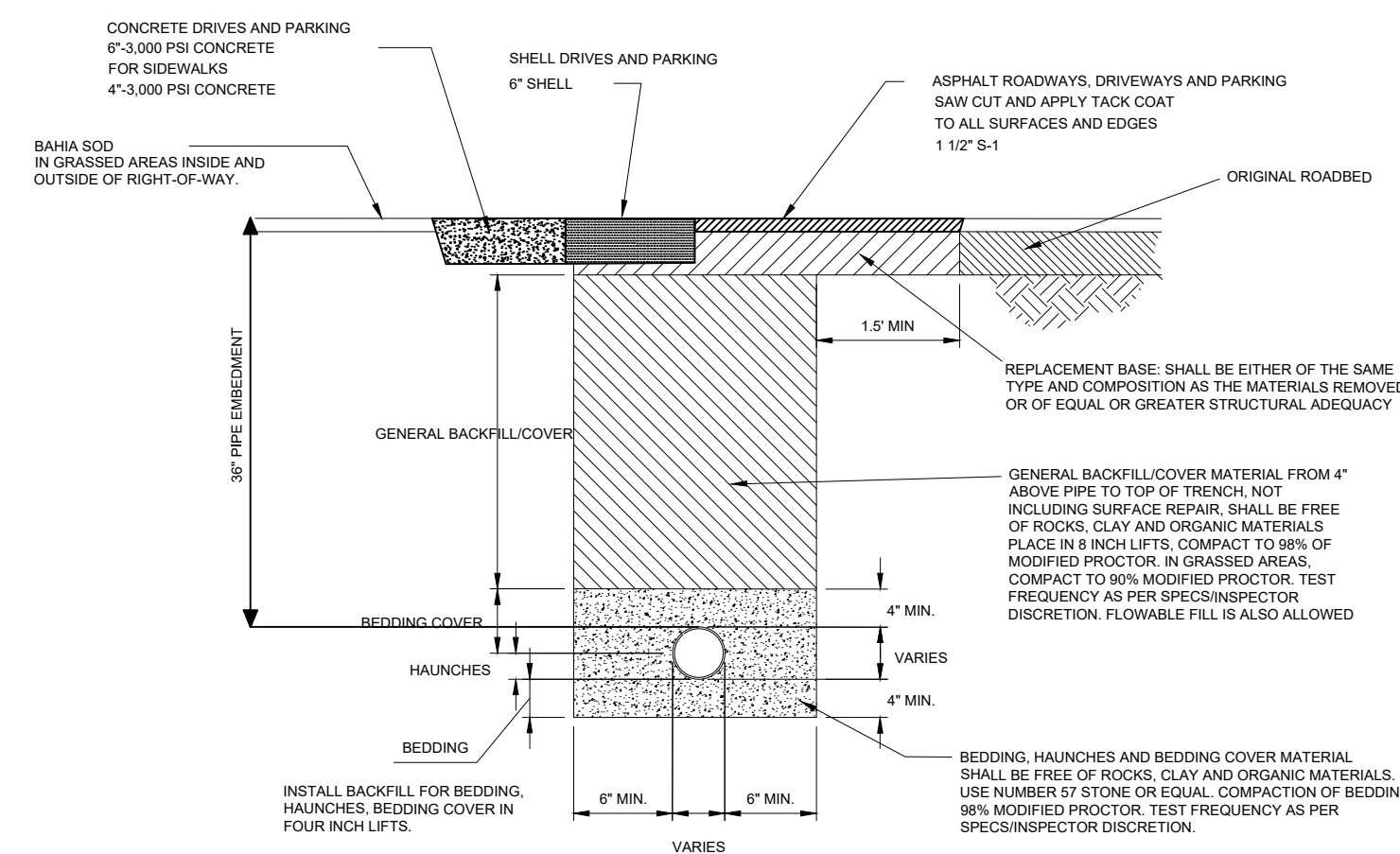
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EIR #6656

**SITE PLAN**  
**COLLEGE RD FORCE MAIN**  
**KWRU**

Revisions	Description

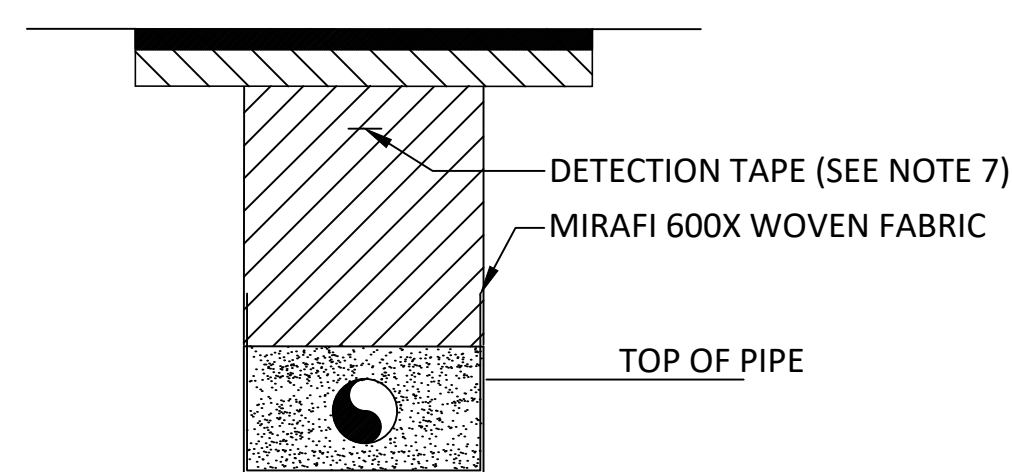
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**TYPICAL TRENCH SECTION**

NOTE 1: LIMIT OF TRENCH WIDTH FOR RESTORATION OUTSIDE THESE LIMITS SHALL BE RESTORED AT CONTRACTOR'S EXPENSE  
 NOTE 2: LIMIT OF TRENCH DEPTH, FLOWABLE FILL SHALL BE USED TO INCASE PROPOSED PIPING.



FILTER FABRIC PLACEMENT OVER UNSUITABLE SOILS

SEE ALSO TRENCH DETAILS FOR ADDITIONAL INFORMATION. ALL ITEMS ARE NOT SHOWN FOR CLARITY.

NOTE: FABRIC MUST EXTEND A MINIMUM OF 12" OVER THE TOP OF THE PIPE OR 12" ABOVE THE UNSTABLE SOILS INTERFACE.

FILTER FABRIC PLACEMENT OVER UNSUITABLE SOILS

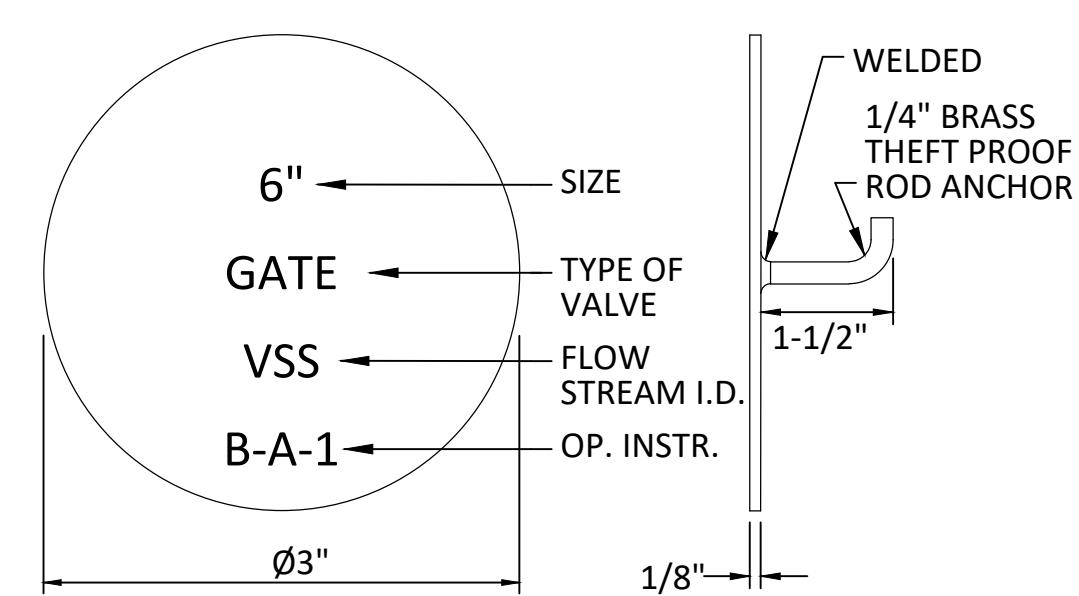
**FILTER FABRIC PLACEMENT DETAIL**

**NOTES:**

- CONTRACTOR SHALL FOLLOW THE BEDDING, HAUNCHES AND BEDDING COVER OF THIS DETAIL FOR ALL PIPELINE INSTALLATION OUTSIDE FDOT JURISDICTION.
- FOR ALL WORK INSTALLED IN FDOT JURISDICTION FOLLOW THE FDOT DETAIL CRITERIA FOR THE TRENCH AREA ABOVE BEDDING COVER.
- TEMPORARY ASPHALT SHALL BE APPLIED TO ALL TRENCHES NOT REPAIRED WITHIN 14 DAYS AFTER PIPING INSTALLATION WHERE THE FLOW ABLE FILL OPTION IS NOT USED.
- AT THE CONTRACTORS OPTION, FLOWABLE FILL MAY BE INSTALLED FLUSH WITH EXISTING PAVEMENT AS A TEMPORARY MEASURE. FINAL RESTORATION WILL REQUIRES MILLING OF THE FLOWABLE FILL AND INSTALLATION OF 1 1/2" OF ASPHALT.
- VACUUM SEWER MAINS SHALL HAVE A MINIMUM COVER OF 30 INCHES, UNLESS OTHERWISE NOTED.
- SEE SURFACE RESTORATION DETAIL FOR RESTORATION REQUIREMENTS
- 6" WIDE DETECTION TAPE WITH METALLIC BACKING TO BE INSTALLED DIRECTLY ON THE CENTERLINE OF MAIN 1' BELOW THE SURFACE. TAPE TO BE MARKED AS STATED IN THE GENERAL NOTES.
- WHERE PORTIONS OF THE BOTTOM OF TRENCHES OR EXCAVATIONS CONSIST OF MATERIAL UNSTABLE TO SUCH A DEGREE THAT, IN THE OPINION OF THE ENGINEER, IT CANNOT ADEQUATELY SUPPORT THE PIPE OR STRUCTURE, THE BOTTOM SHALL BE OVER-EXCAVATED AND STABILIZED WITH APPROVED COARSE GRANULAR STABILIZATION MATERIAL. MINIMUM DEPTH OF OVER-EXCAVATION IS 2 FEET. IN ADDITION, FILTER FABRIC WILL ALSO BE USED AS SHOWN IN THE DETAIL TO ENCAPSULATE THE BEDDING MATERIAL.

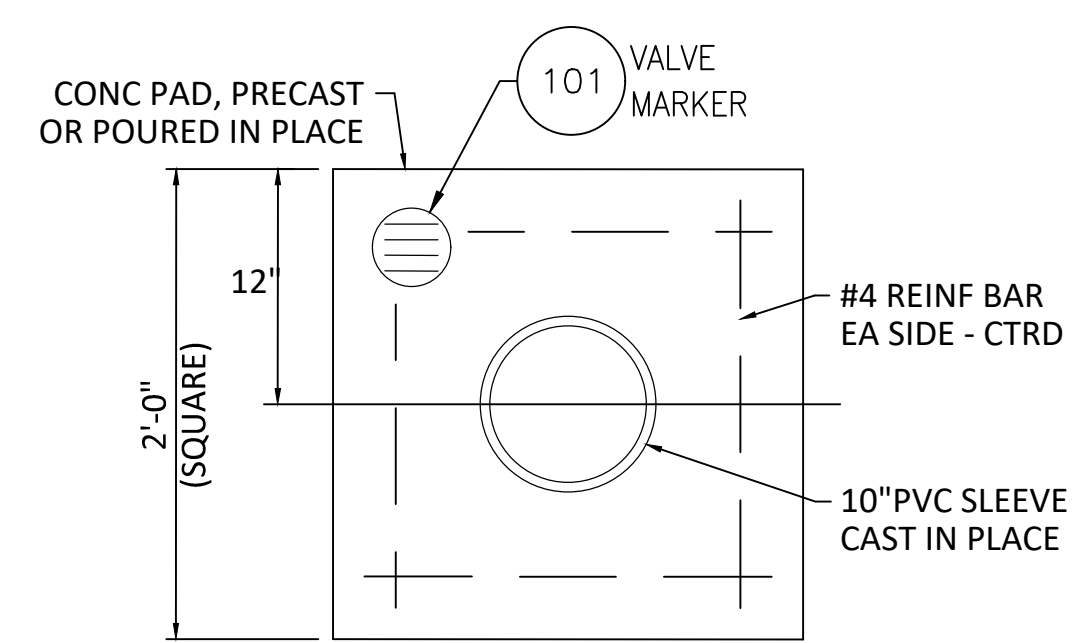
**STANDARD TRENCHING DETAIL**

100



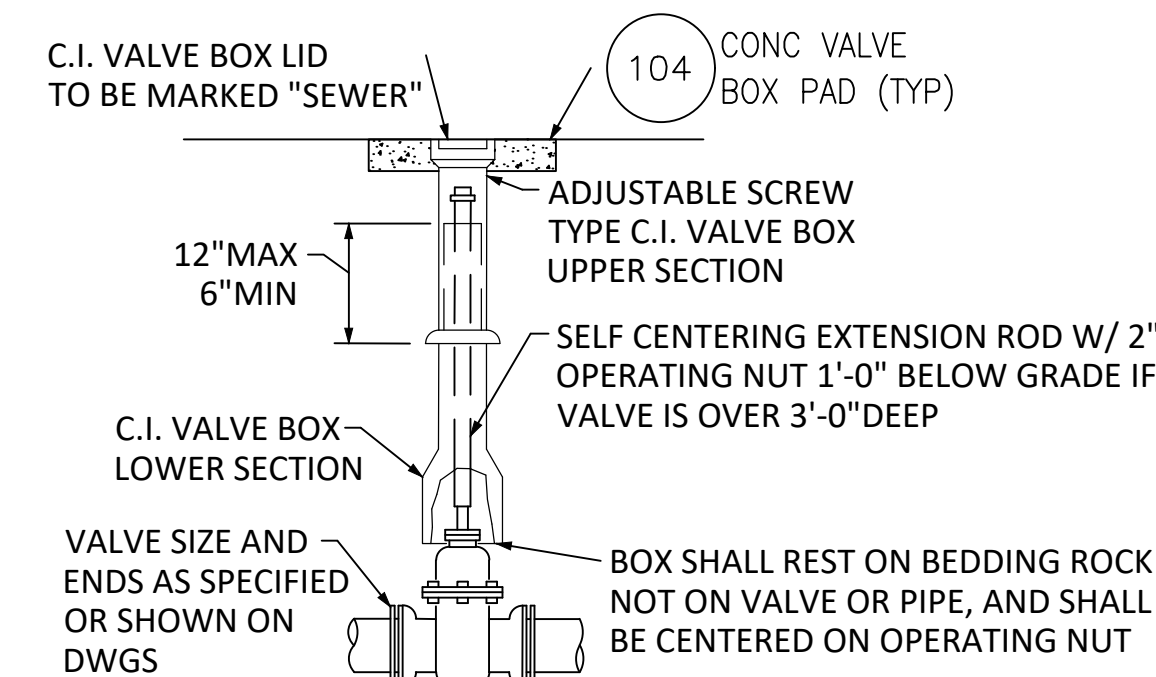
**VALVE MARKER**

101



**CONC VALVE BOX PAD**

102



**NOTES**

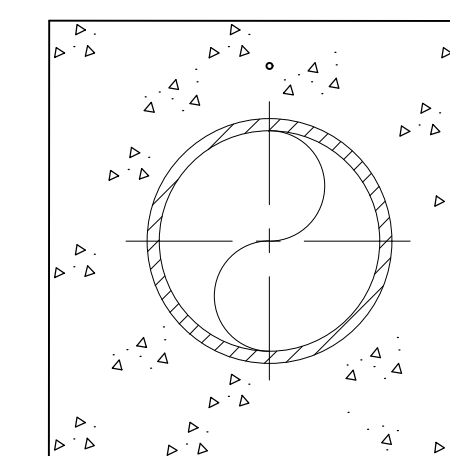
- ADJUSTABLE CAST IRON VALVE BOX SHALL BE TYLER / UNION 6850 SERIES OR EQUAL.
- SEE SPECIFICATION SECTION 15100 FOR MORE INFORMATION ON VALVES.

**GATE OR PLUG VALVE WITHOUT GEAR OPERATOR**

103

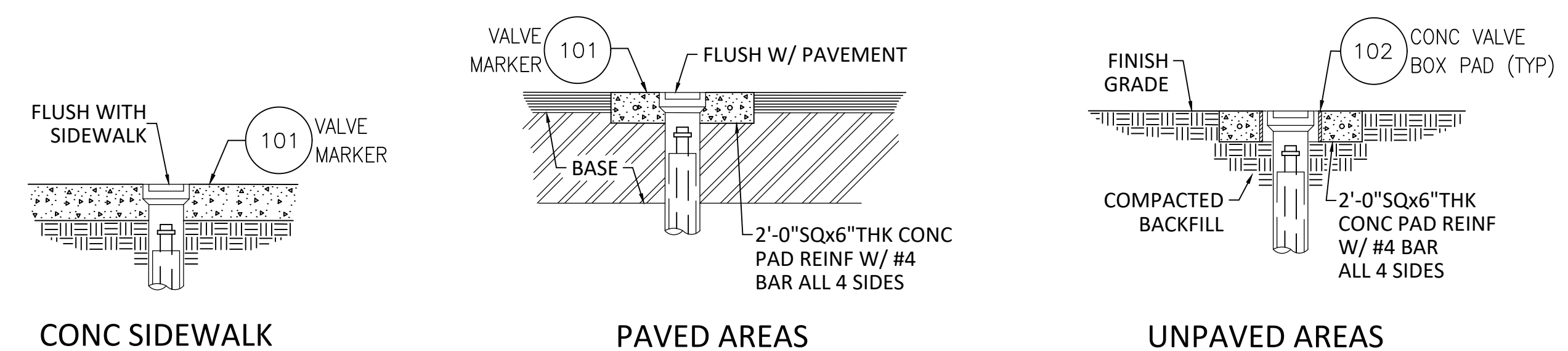
**NOTES:**

- CONCRETE ENCASEMENT SHALL BE 3000 PSI.
- CONCRETE ENCASEMENT LENGTH AS NOTED IN DRAWINGS.
- PIPE SHALL BE ENCASED AS SOON AS COVER IS LESS THAN 30" TO TOP OF PIPE.
- VACUUM PIPE TO BE WRAPPED IN PLASTIC BEFORE CONCRETE ENCASEMENT.



**CONCRETE PIPE ENCASEMENT**

105



**VALVE BOX SETTING DETAILS**

104

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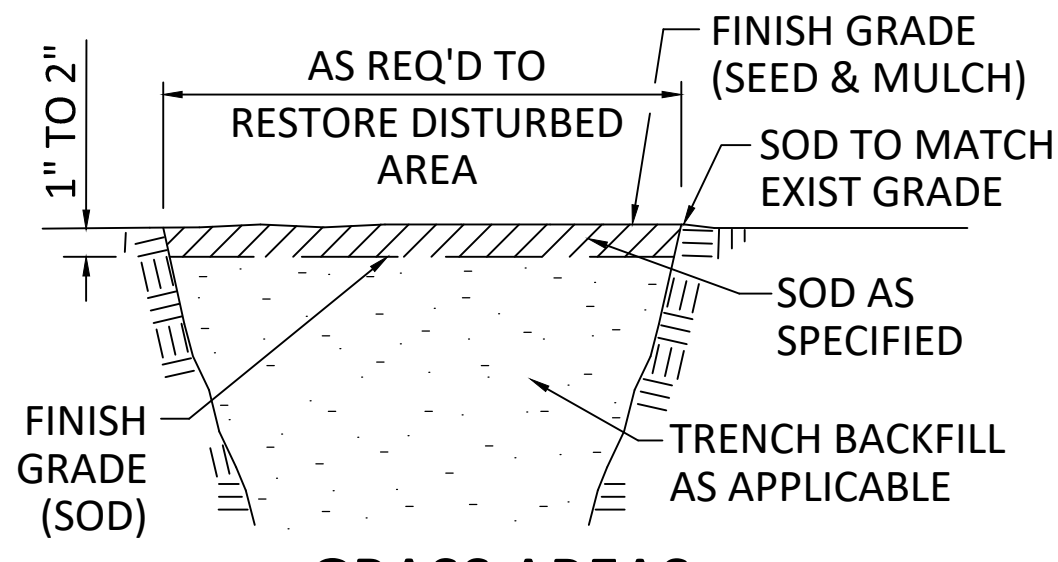
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 Stephen J. Suggs  
 Professional Engineer  
 State of Florida  
 Registration No. 85237

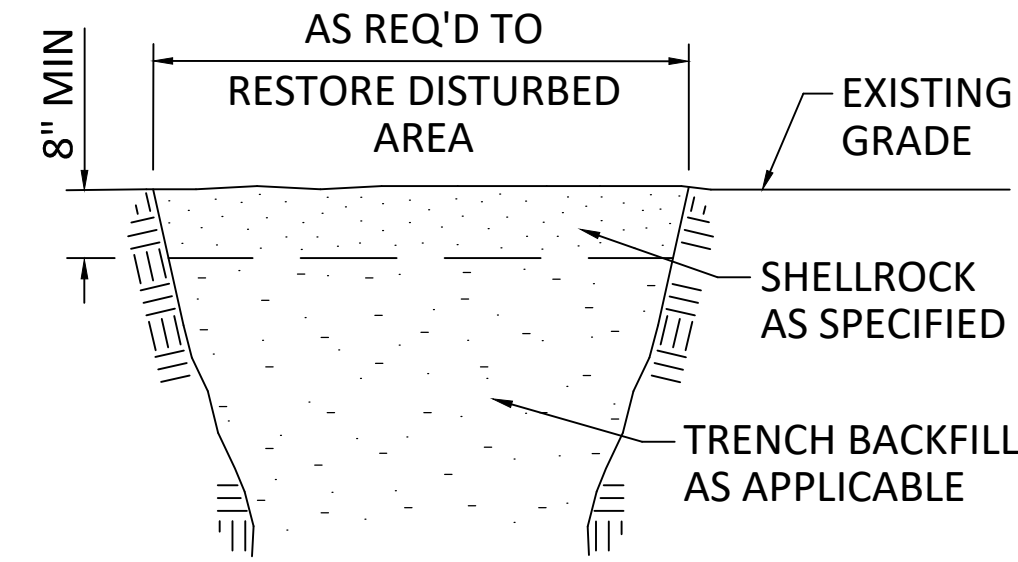






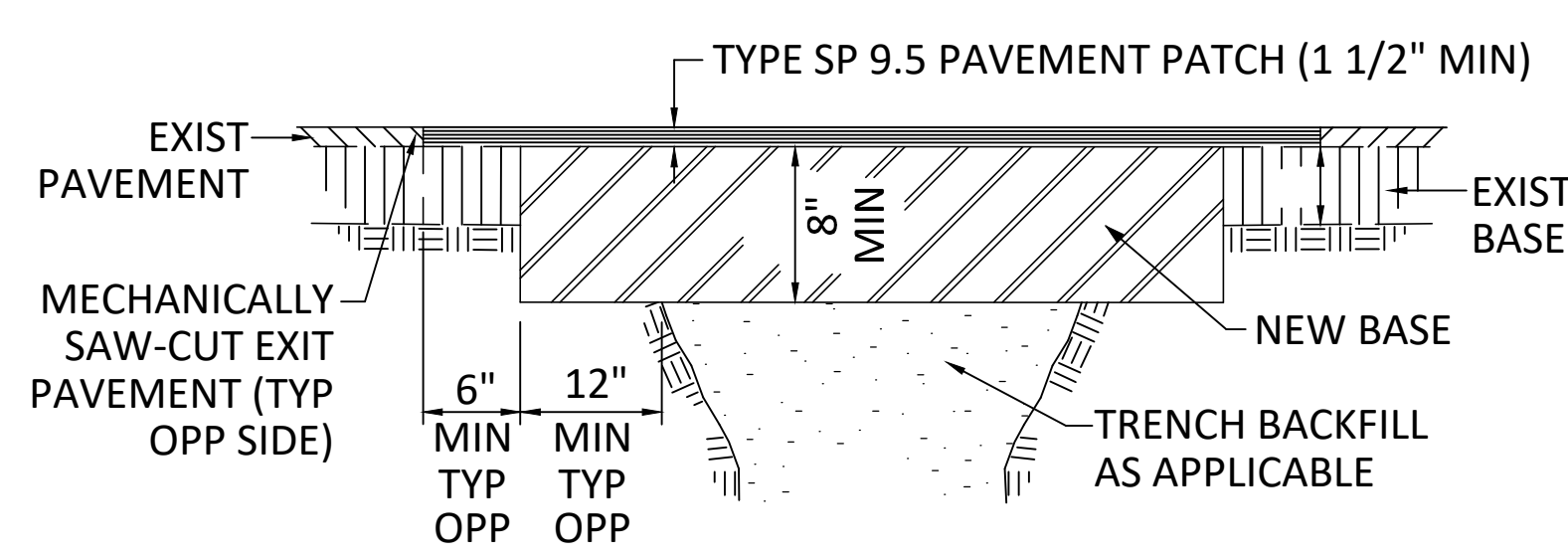
GRASS AREAS

- TYPE ① SOD
- TYPE ⑥ SEED & MULCH



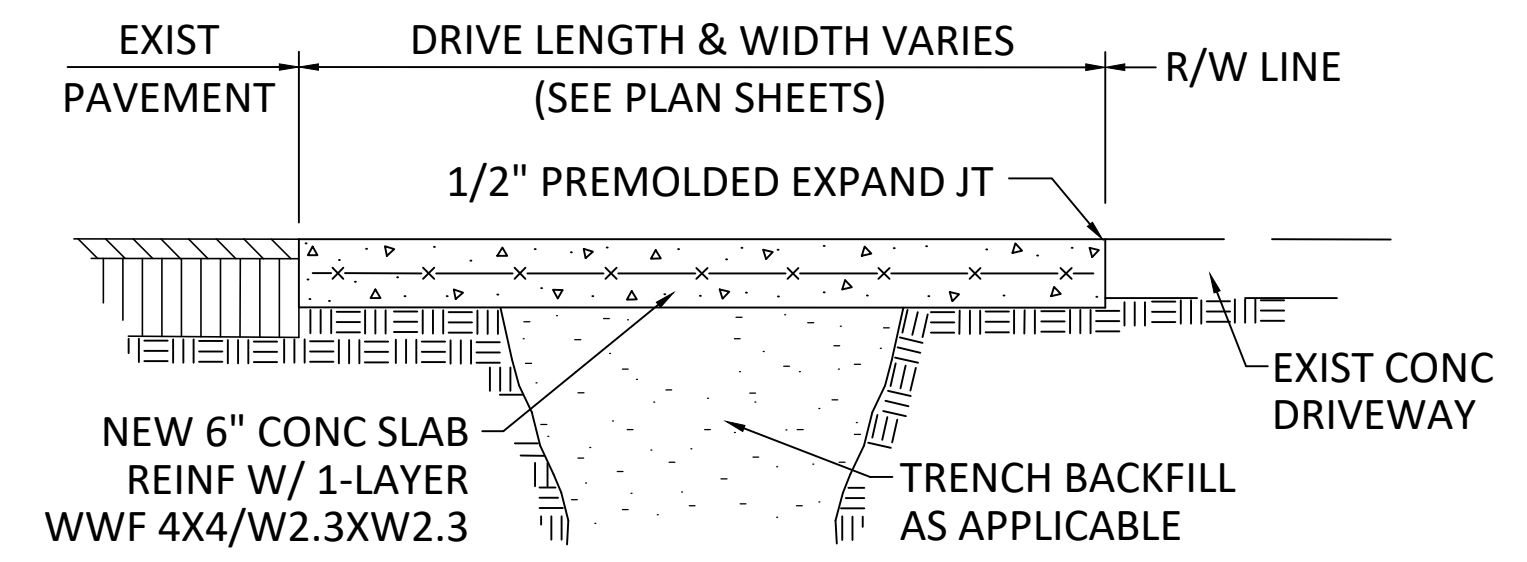
ROCK ROADWAYS AND DRIVEWAYS

- TYPE ①



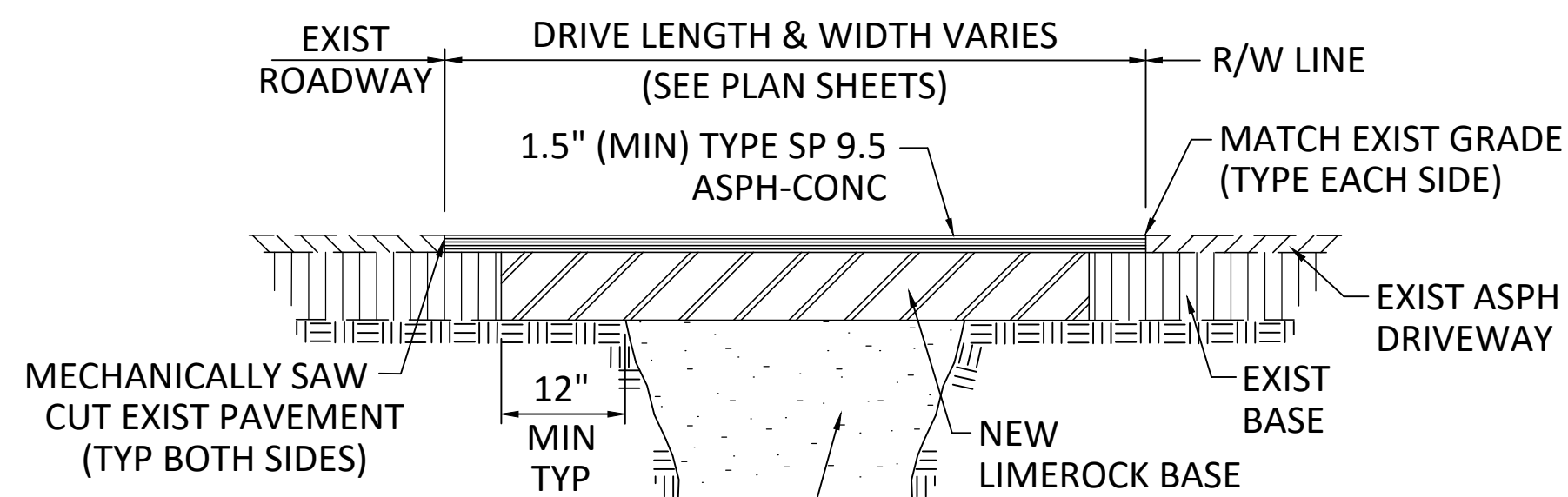
ASPHALT ROADWAYS

- TYPE ②



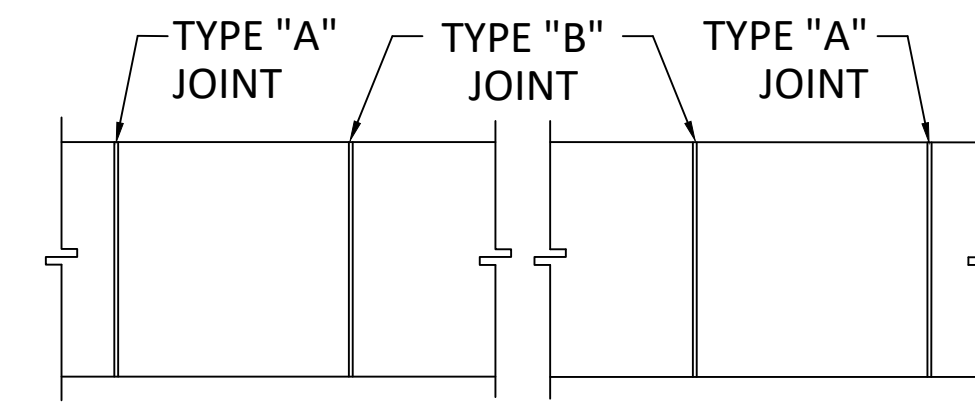
CONCRETE DRIVEWAYS

- TYPE ③

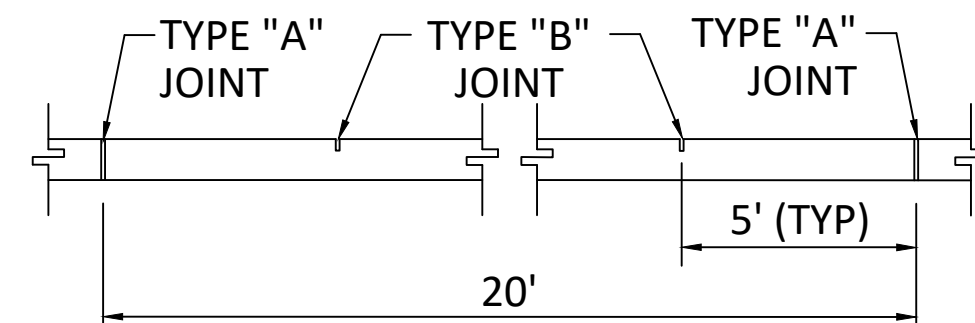


ASPHALT DRIVEWAYS

- TYPE ④



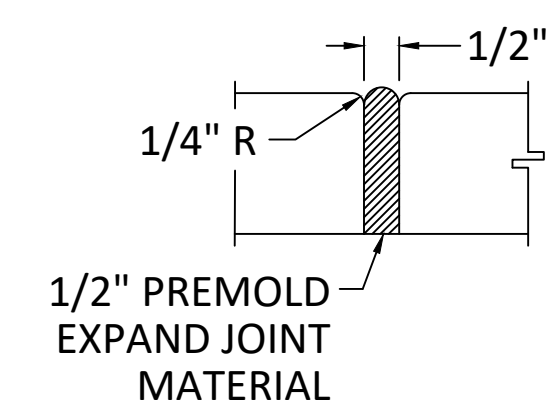
PLAN



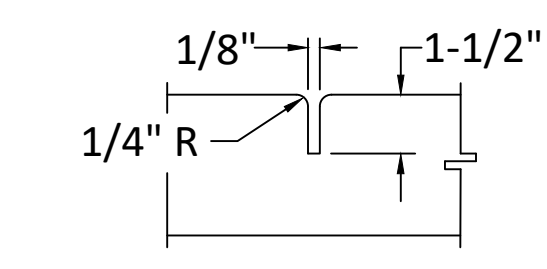
ELEVATION

CONCRETE SIDEWALKS TYPE

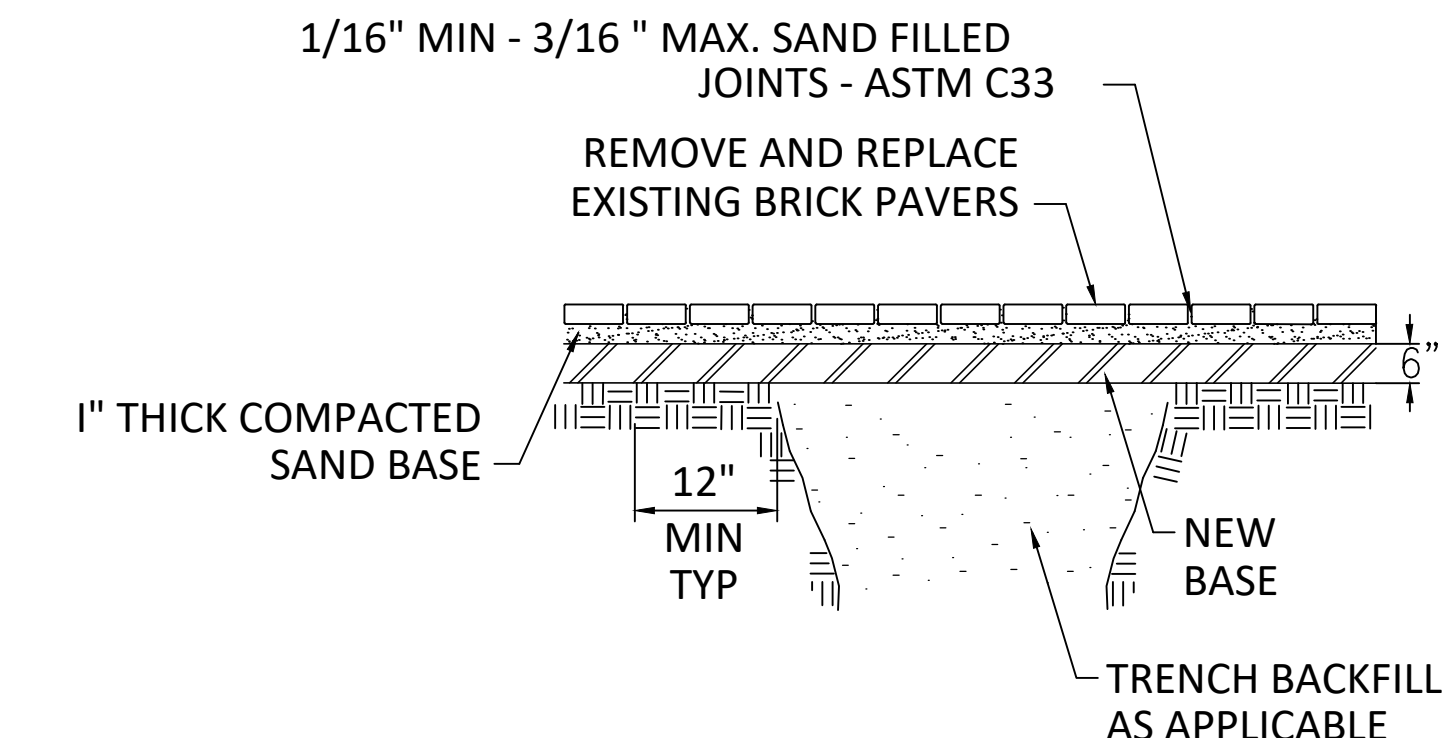
- TYPE ⑤



TYPE "A" JOINT



TYPE "B" JOINT



BRICK PAVERS

- TYPE ⑦

1) ASPHALT ROADWAYS :

- A. PAVEMENT MATERIALS SHALL BE AS SPECIFIED.
- B. PREPARE BASE SECTION, SAW CUT EXISTING PAVEMENT AS APPLICABLE PRIME COAT, TACK COAT AND PLACE ASPHALT PATCH IMMEDIATELY FOLLOWING PIPE INSTALLATION.
- C. BASE MATERIAL SHALL BE TWICE THE THICKNESS OF EXISTING BASE MATERIAL, BUT IN NO CASE BE LESS THAN 8". BASE MATERIAL SHALL BE PLACED IN LIFTS NOT TO EXCEED 8" AND COMPACTED TO 98% OF MAXIMUM DENSITY AS DETERMINED BY AASHTO T-180.
- D. PAVEMENT PATCH THICKNESS TO MATCH EXISTING PAVEMENT THICKNESS, BUT IN NO CASE LESS THAN 1 1/2".
- E. WHEN OVERLAY IS NOT REQUIRED CONTRACTOR OR ENGINEER SHALL SCHEDULE A FIELD INSPECTION WITH THE MONROE COUNTY RIGHT OF WAY AUTHORITY TO INSPECT CONDITION OF PATCH 90 DAYS AFTER PLACEMENT. IF SAID AUTHORITY FINDS PATCH TO BE UNACCEPTABLE THEN THE PATCH SHALL BE COMPLETELY REMOVED AND REPLACED AT NO ADDITIONAL COST TO THE OWNER.
- F. 90 DAYS AFTER PLACEMENT OF ASPHALT PATCH, OVERLAY ROADWAY TO THE EXTENT AS SHOWN ON DRAWINGS AND NOTED HEREIN WITH A MINIMUM OF 1 1/2" TYPE SP-12.5 ASPHALTIC CONCRETE APPLIED IN 1 LIFT.
- G. APPLY TACK COAT PRIOR TO PLACING ASPHALTIC OVERLAY.
- H. EDGES OF OVERLAY SHALL BE KEYED TO EXISTING PAVEMENT.
- I. WHERE OVERLAY IS REQUIRED, THE PAVEMENT PATCH DOES NOT NEED TO BE COMPLETED.

2) CONCRETE DRIVES :

- A. AS APPLICABLE, EXISTING CONCRETE DRIVEWAYS SHALL BE REMOVED AND REPLACED FROM THE R/W LINE TO EDGE OF ROADWAY COMPLETELY. CONCRETE DRIVE DAMAGE OUTSIDE OF THE R/W SHALL ALSO BE RESTORED.
- B. NEW SLAB SHALL BE CONSTRUCTED TO THE LINES AND GRADES OF EXISTING DRIVEWAY PRIOR TO CONSTRUCTION.
- C. CONCRETE SHALL BE 3000 PSI AS SPECIFIED.
- D. 8" OF LIMEROCK OR FLOWABLE FILL SHALL BE USED FOR THE BASE.
- E. SUBGRADE SHALL BE PREPARED AS SPECIFIED.

3) ASPHALT DRIVES :

- A. REMOVE EXISTING ASPHALT DRIVEWAY SURFACE FROM R/W LINE TO EDGE OF ROADWAY COMPLETELY.
- B. PREPARE BASE SECTION AND PRIME COAT AS SPECIFIED DURING TRENCH BACKFILLING.
- C. APPLY TACK COAT AS SPECIFIED PRIOR TO PLACING ASPHALT.
- D. PAVEMENT MATERIALS SHALL BE AS SPECIFIED.
- E. NEW PAVEMENT SHALL BE CONSTRUCTED TO THE LINES AND GRADES OF EXISTING DRIVEWAYS PRIOR TO CONSTRUCTION.

4) CONCRETE SIDEWALKS :

- A. SIDEWALK SHALL BE 4" THICK EXCEPT IN DRIVEWAYS WHERE THE THICKNESS SHALL BE 6". CONCRETE SHALL BE 3000 PSI AS SPECIFIED.
- B. TYPE "A" JOINTS SHALL BE PLACED AT 20' CENTERS ON SIDEWALKS PC'S AND PT'S OF CURVES, JUNCTIONS OF EXISTING AND NEW SIDEWALKS AND WHERE SIDEWALK ABUTS CONCRETE CURBS, DRIVEWAYS AND SIMILAR STRUCTURES.
- C. TYPE "B" JOINTS SHALL BE PLACED AT 5' CENTERS ON SIDEWALKS.
- D. 8" OF LIMEROCK OR FLOWABLE FILL SHALL BE USED FOR THE BASE.

5) GRASS AREAS :

- A. SOD AND SEED & MULCH SHALL BE AS SPECIFIED
- B. DISTURBED AREAS ALONG CANAL R/W SHALL BE REGRADED AT A 20:1 REVERSE SLOPE, UNLESS NOTED OTHERWISE.

6) BRICK PAVERS:

- A. REPLACE BRICK PAVERS TO MATCH THE LINE AND GRADES OF EXISTING DRIVEWAY PRIOR TO CONSTRUCTION.
- B. 6" OF LIMEROCK SHALL BE USED FOR THE BASE.
- C. EDGE RESTRAINT SHALL MATCH EXISTING.

TYPICAL PIPELINE ROUTE SURFACE RESTORATION DETAILS AND NOTES

NOTE: SEE SURFACE RESTORATION NOTES FOR ADDITIONAL DETAILS

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RESTORATION DETAILS  
 COLLEGE RD. FORCE MAIN  
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 No. 85237  
 FLORIDA  
 PROFESSIONAL ENGINEER

Stephen J. Suggs  
 Professional Engineer  
 State of Florida  
 Registration No. 85237

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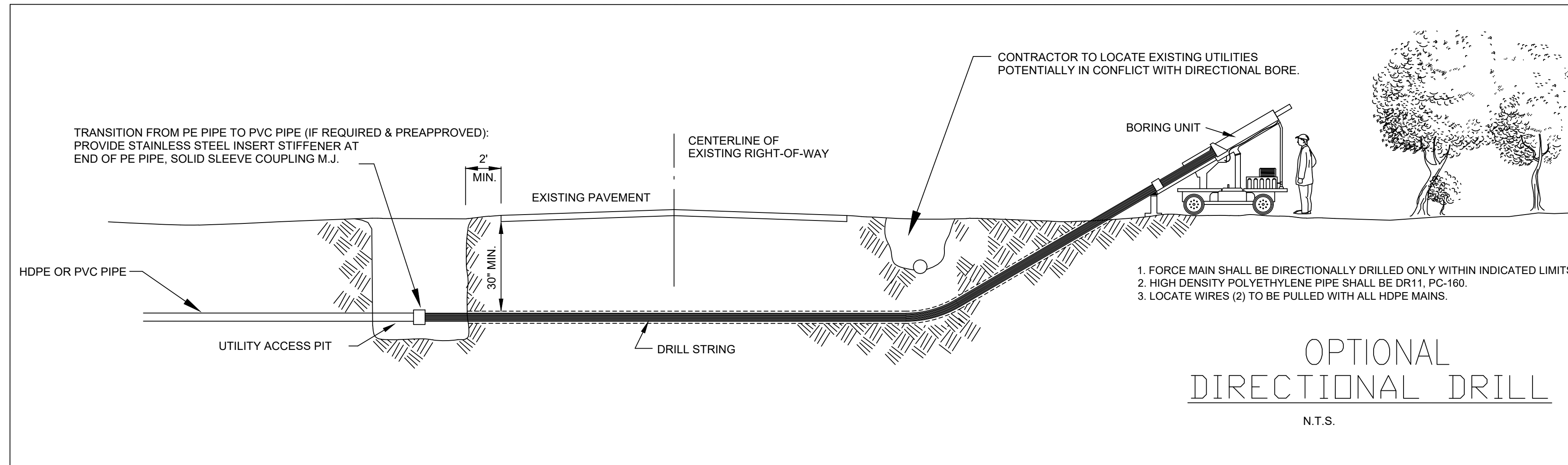
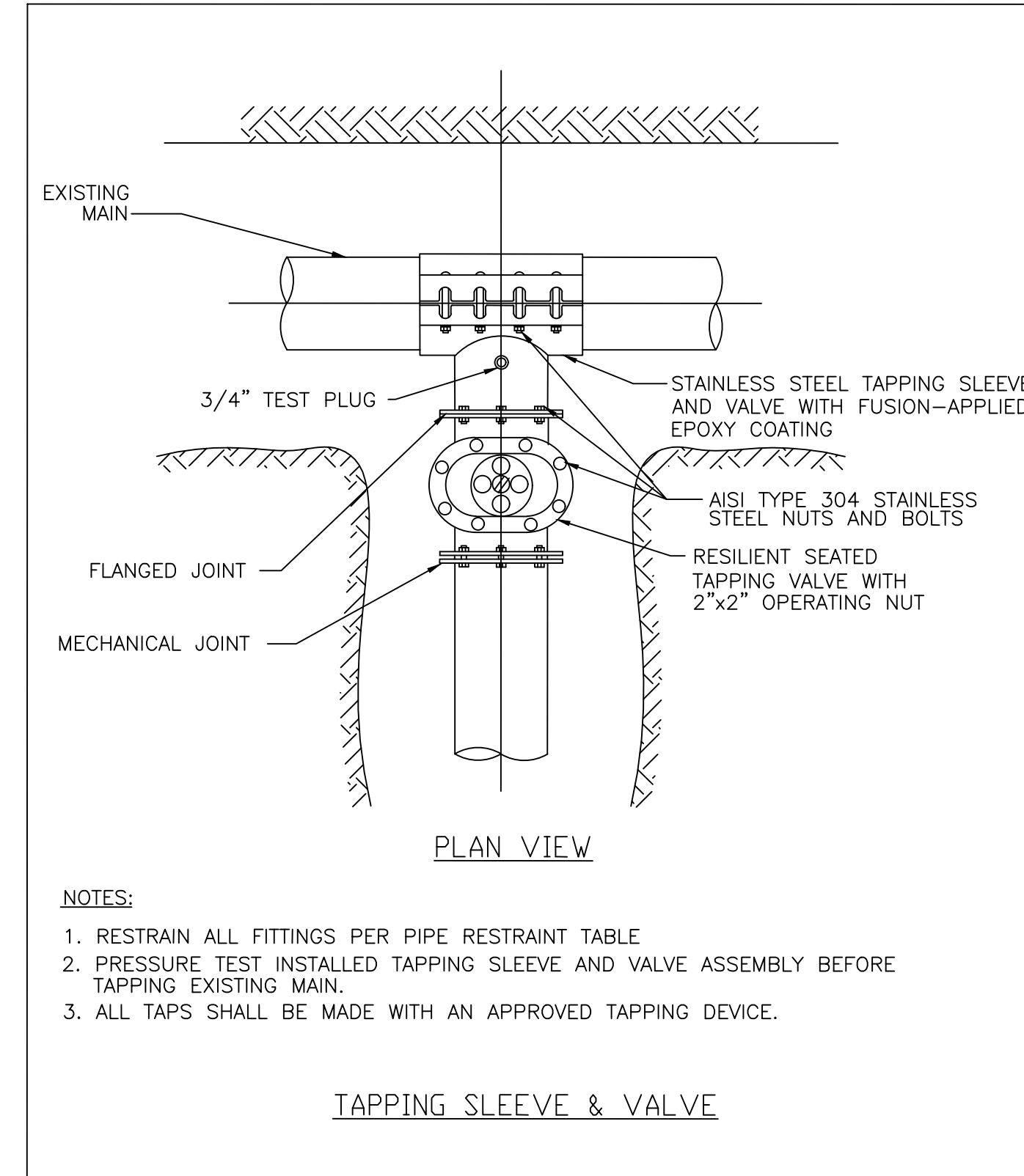


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**TESTING NOTES:**

1. FORCE MAIN SEWER PIPE SHALL BE PRESSURE TESTED IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS.
2. TEST PRESSURE SHALL BE 100 P.S.I. FOR SEWAGE FORCE MAINS, UNLESS FURTHER SPECIFIED BY FCAA OR THE COUNTY ENGINEERING DEPARTMENT. THE LEAKAGE TEST SHALL BE CONDUCTED FOR TWO (2) HOURS AND MAXIMUM ALLOWABLE LEAKAGE SHALL BE IN ACCORDANCE WITH THE TABLE BELOW. FOOTAGE FOR SERVICE LATERALS AND TAPS FOR FIRE HYDRANTS, OR NUMBER OF PIPE JOINTS SHALL BE DISREGARDED WHEN CALCULATING ALLOWABLE LEAKAGE. TO MAINTAIN REQUIRED PRESSURE, SHALL BE MEASURED BY A 5/8 INCH METER INSTALLED ON THE DISCHARGE SIDE OF THE TEST PUMP, OR BY PUMPING FROM A CALIBRATED CONTAINER.

NOMINAL PIPE SIZE INCHES	AVERAGE TEST PRESSURE IN LINE - P.S.I.				
	50	100	150	200	250
4"	.19	.27	.33	.38	.43
6"	.29	.41	.50	.57	.64
8"	.38	.54	.66	.76	.85
10"	.48	.68	.83	.96	1.07
12"	.57	.81	.99	1.15	1.28



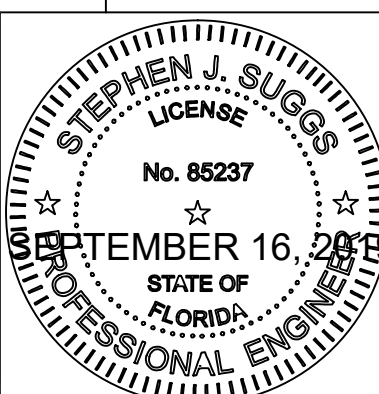
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**GENERAL DETAILS**  
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