"City on the Gulf"

CITY OF VENICE, FLORIDA

Purchasing Department

401 W. Venice Avenue
Venice, FL 34285

Invitation to Bid

ITB Number 3083-18

Date of Issue: March 17, 2018

Submission Deadline: April 20, 2018 at 2:00 PM

Title and Purpose of ITB:

EWRF Lift Station Force Main Relocation and Reaeration Blower Replacement Projects

Volume 1

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CITY OF VENICE
EWRF LIFT STATION FORCE MAIN RELOCATION AND REAERATION BLOWER REPLACEMENT PROJECTS

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CITY OF VENICE
VENICE, FLORIDA
EWRF REAREATION BLOWER REPLACEMENT

SEALS AND CERTIFICATIONS PAGE

ENGINEER:
Hazen and Sawyer
7334 Delainey Court
Sarasota, Florida 34240

For: General, Civil, Mechanical: Andrew Jon Coleman License No. 70650	For: Electrical, Instrumentation: Daniel B. Schmidt License No. 40233

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CITY OF VENICE
VENICE, FLORIDA
EWRF LIFT STATION FORCE MAIN RELOCATION

SEALS AND CERTIFICATIONS PAGE

ENGINEER:
Jones Edmunds & Associates, Inc.
7230 Kyle Court
Sarasota, Florida 34240

For: General, Civil, Mechanical: Douglas R. Young License No. 44204	For: Structural: John Sobczak License No. 71407

+ + END OF SEALS AND CERTIFICATIONS PAGE + +

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INVITATION TO BID

The City of Venice invites sealed bids from qualified bidders to provide the following goods or services, which is described in detail in the Specifications.

Bid No.: 3083-18

Bid Title: EWRF Lift Station Force Main Relocation and Reaeration Blower Replacement Projects

PROJECT DESCRIPTION: The Contractor shall furnish all labor, materials, equipment, tools, services and incidentals to complete all work required by these Specifications and as shown on the Drawings. The Contractor shall perform the work complete, in place and ready for continuous service, and shall include repairs, testing, permits, clean-up, replacements and restoration required as a result of damages caused during this construction. All materials, equipment, skills, tools and labor which is reasonably and properly inferable and necessary for the proper completion of the work in a substantial manner and in compliance with the requirements stated or implied by these Specifications or Drawings shall be furnished and installed by the Contractor without additional compensation, whether specifically indicated in the Contract Documents or not. The Contractor shall comply with all Municipal, County, State, Federal, and other codes which are applicable to the proposed construction work.

All work is to be performed at the Eastside Water Reclamation Facility.

BID OPENING LOCATION: City of Venice, Venice City Hall, Community Hall, room # 114, 401 West Venice Ave., Venice FL 34285

BID SUBMITTAL DEADLINE and BID OPENING DATE & TIME: April 20 at 2:00 PM

PRE-BID MEETING: YES

DATE & TIME: March 29, 2018 at 2:00 PM

LOCATION: City of Venice Eastside Water Reclamation Facility, 3510 Laurel Road East, Venice FL 34275

Specifications and Bid documents are available by calling Onvia DemandStar at (800) 711-1712 or by their Internet address at http://www.demandstar.com. Proposers may also pick up Bid documents at the City of Venice Procurement- Finance Department, Room 204, 401 West Venice Ave., Venice Florida 34285, **(941) 882-7422** at no charge.

A non-mandatory pre-bid meeting/site visit will be held on March 29, 2018 at 2:00 p.m., City of Venice Eastside Water Reclamation Facility, 3510 Laurel Road East, Venice FL 34275. Representatives from the City will be present to discuss the overall project and the Invitation to Bid**. Interested Firms are encouraged to attend.**

All questions, comments, or concerns about this ITB must be submitted in writing to Mr. Peter Boers, Procurement- Finance Department, for the City of Venice, Room 204, 401 West Venice

Avenue, Venice, FL 34285 or e-mail at pboers@venicegov.com Mr. Boers is the only designated representative of the City authorized to respond to comments, questions, and concerns. The City will not respond to comments, questions or concerns addressed to any person other than Mr. Boers. If the City determines that a particular comment, question or concern necessitates a global response to all Proposers, the City will issue a clarifying memorandum or addendum. **The final day that the City will accept questions will be April 10 by 1:00 p.m.**

Bids must be submitted in **four sets** and at least one set must bear an original signature, in a sealed envelope marked **"Invitation to Bid # 3083-18: "EWRF Lift Station Force Main Relocation and Reaeration Blower Replacement Projects"** and mailed or delivered to the City of Venice- Purchasing Department, 401 W. Venice Ave. Room # 204, Venice, FL 34285, no later than the deadline specified. The City assumes no responsibility for bids received after the bid submittal time or at any location other than that specified, no matter what the reason. Late bids will be held unopened and will not be considered for award.

No bid will be received after the specified time for acceptance and no bidder may withdraw his bid within a period of ninety (90) days after the actual date of opening thereof.

Bids will be considered only from bidders who have the applicable license, if a license is required by the City of Venice and/or State of Florida, for the type of work specified. A copy of the applicable license must be submitted with bid if a license is required.

The City reserves the right to reject any or all bids in whole or in part, with or without cause, to waive any requirements, irregularities or technical defects therein, when it is deemed to be in the interest of the City.

CITY OF VENICE, FLORIDA

Publish: March 17, 2018
March 21, 2018

City of Venice Utilities Department
City of Venice, Florida

EWRF Lift Station Force Main Relocation and Reaeration Blower Replacement Projects

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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 which are applicable to both the singular and plural thereof.

A. Issuing Office: The office from which the Bidding Documents are to be issued and here the bidding procedures are to be administered.

ARTICLE 2 – BIDS RECEIVED

2.01 Refer to the Invitation To Bid for information on receipt of Bids.

ARTICLE 3 – LOCATION AND DESCRIPTION OF PROJECT

3.01 Refer to Section 01100, Summary of Work – EWRF Lift Station Force Main Relocation and Section 01010, Summary of Work – EWRF Blower Replacement, in the General Requirements for the location and description of the Project.

ARTICLE 4 – COPIES OF BIDDING DOCUMENTS

4.01 Refer to the Invitation To Bid for information on location where Bidders may examine and obtain the Bidding Documents.

4.02 (Not Used)

4.03 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.

4.04 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 grant permission for any other use.

4.05 Bidders who obtain solicitation documents from sources other than the Owner or download from http://www.demandstar.com/ must officially register receipt of the solicitation with the City's Procurement – Finance Department in order to be placed on the notification list for any forthcoming addendum or other official communications. Failure to register as a prospective Bidder may cause your submittal to be rejected as non-responsive if you have submitted a response without acknowledgment of issued addenda. The Owner is not responsible for the accuracy of bid documents and information obtained from any source other than http://www.demandstar.com/.

ARTICLE 5 – QUALIFICATIONS OF BIDDERS

5.01 Bidders shall be experienced in the kind of Work to be performed, shall have the necessary equipment therefor, and shall possess sufficient capital to properly execute the Work within the time allowed. Bids received from Bidders who have previously failed to complete work within the time required, or who have previously performed similar work in an unsatisfactory manner, may be rejected. A Bid may be rejected if Bidder cannot show that Bidder has the necessary ability, plant, and equipment to commence the Work at the time prescribed and thereafter to prosecute and complete the Work at the rate or within the times specified. A Bid may be rejected if Bidder is already obligated for the performance of other work which would delay the commencement, prosecution or completion of the Work.

5.02 To demonstrate qualifications to perform the Work, Bidder shall submit within 5 days after Bid opening, upon Owner's request, a separate Bidder Qualifications Statement that will be furnished by OWNER. An example of the Bidder Qualifications Statement is bound in the Project Manual.

5.03 Bidders shall be qualified to do business in the state where the Project is located or covenant to obtain such qualification prior to signing the Agreement.

5.04 Bids will be received only from contractors licensed or registered by the State of Florida.

ARTICLE 6 – EXAMINATION OF BIDDING DOCUMENTS, OTHER RELATED DATA, AND SITE

6.01 Subsurface and Physical Conditions

A. The Supplementary Conditions identify:

1. Those reports of explorations and tests of subsurface conditions at or contiguous to the Site that have been utilized by Engineer in preparation of the Bidding Documents.

2. Those drawings of physical conditions relating to existing surface or subsurface structures (except Underground Facilities) which are at or contiguous to the Site, that have been utilized by Engineer in preparation of the Bidding Documents.

B. Electronic copies of the reports and drawings referenced in Paragraph 6.01.A above will be made available by Owner to any Bidder on request. Those reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which Bidder is entitled to rely as provided in Paragraph 4.02 of the General Conditions, has been identified and established in Paragraph SC-4.02 of the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion drawn from any "technical data" or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

6.02 Underground Facilities - Physical Conditions

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

6.03 Hazardous Environmental Condition

A. Owner has no actual knowledge of a Hazardous Environmental Condition at the Site.

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

6.05 Other Related Data (Not Used)

6.06 On request, Owner will provide Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies as Bidder deems necessary for preparing and submitting a Bid. Bidder shall fill all holes and clean up and restore the Site to its original conditions upon completion of such explorations, investigations, tests, and studies. Bidder shall comply with all Laws and Regulations relative to such explorations, investigations, tests, and studies.

6.07 A single Site visit has been scheduled following the pre-bid conference. No other Site visits will be allowed without Owner's approval.

6.08 (Not Used)

6.09 (Not Used)

6.10 It is the responsibility of Bidder, before submitting a Bid to:

A. examine and carefully study the Bidding Documents, the other related data identified in the Bidding Documents and Addenda (if any);

B. visit the Site and become familiar with and satisfy Bidder as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;

C. become familiar with and satisfy Bidder as to the Laws and Regulations that may affect cost, progress and performance of the Work;

D. carefully study all:

1. reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities), if any, that have been identified in the Supplementary Conditions in Paragraph SC-4.02 as containing reliable "technical data", and

2. reports and drawings of Hazardous Environmental Condition identified at the Site, if any, that have been identified in the Supplementary Conditions in Paragraph SC-4.06 as containing reliable "technical data";

E. consider the information known to Bidder; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in Bidding Documents with respect to the effect of such information, observation, 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, including applying any specific means, methods, techniques, sequences and procedures of construction expressly required by the Bidding Documents; and

3. Bidder's safety precautions and programs;

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

G. become aware of the general nature of work (if any) to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents;

H. promptly give Engineer written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder; and

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

6.11 The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 6, that without exception the Bid is premised upon performing the Work required by the Bidding Documents and applying any specific means, methods, techniques, sequences, or procedures of construction that may be shown or indicated or expressly required by the Bidding Documents, that Bidder has given Engineer written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has discovered in the Bidding Documents and the written resolutions thereof by Engineer are acceptable to Bidder, and that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing the Work.

ARTICLE 7 – PRE-BID MEETING

7.01 A non-mandatory Pre-Bid Meeting will be held at the date and time indicated in the Invitation To Bid. Representatives of the Owner and Engineer will be present to discuss the Project. Owner will transmit to all prospective Bidders of record such Addenda as Owner considers necessary in response to questions raised at the pre-Bid conference. Oral statements may not be relied upon and will not be binding or legally effective.

ARTICLE 8 – SITE AND OTHER AREAS

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

ARTICLE 9 – INTERPRETATIONS AND ADDENDA

9.01 All questions about the meaning or intent of the Bidding Documents shall be submitted to Owner in writing. To receive consideration, questions must be received by Owner by the date indicated in the Invitation To Bid. Interpretations or clarifications considered necessary by Owner in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by Owner as having received the Bidding Documents for receipt not later than three days prior to the date for the opening of Bids. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

9.02 Addenda may also be issued to clarify, correct or change the Bidding Documents as deemed advisable by Owner or Engineer. Such Addenda, if any, will be issued in the manner and within the time period stated in Paragraph 9.01 of these Instructions to Bidders.

ARTICLE 10 – BID SECURITY

10.01 A Bid shall be accompanied by Bid security made payable to Owner in the amount of 5% of Bidder's maximum Bid price and in the form of Bid bond.

10.02 Bid bond shall be on the form bound in the Project Manual. Bid bond shall be issued by a surety complying with the requirements of Paragraphs 5.01 and 5.02 of the General Conditions.

10.03 The Bid security of the Successful Bidder will be retained until such Bidder has executed the Contract Documents, furnished the required contract security, and complied with the other conditions of the Notice of Award, whereupon the Bid security will be returned. If the Successful Bidder fails to sign and deliver the Contract Documents and furnish the required contract security within 15 days after the Notice of Award, Owner may annul the Notice of Award and may retain from the Bid security an amount equal to the damages which Owner may suffer by reason of such failure. Said damages shall be the difference between that Bidder's Bid and the Bid of the next lowest, responsible and responsive Bidder, but such amount shall not exceed the Bid security amount, and, if there is no such next lowest, responsible and responsive Bidder, then the Bid security amount of that Bidder will be forfeited to the Owner as liquidated damages for such failure.

10.04 The Bid security of other Bidders whom Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of the seventh day after the Effective Date of the Agreement or the ninety-first day after the Bid opening whereupon the Bid security furnished by such Bidders will be returned. The Bid security of Bidders whom Owner believes do not have a reasonable chance of receiving an award will be returned within seven days of the Bid opening.

ARTICLE 11 – CONTRACT TIMES

11.01 The number of days within which Work is to be completed and ready for final payment (the Contract Times) are set forth in the Agreement.

ARTICLE 12 – LIQUIDATED AND SPECIAL DAMAGES

12.01 Provisions for liquidated and special damages, if any, are set forth in the Agreement.

ARTICLE 13 – SUBSTITUTE AND "OR EQUAL" ITEMS

13.01 The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration of possible substitute or "or-equal" items. Whenever it is specified or described in the Bidding Documents that a substitute or "or-equal" item of material or equipment may be furnished or used by Contractor if accepted by Engineer, application for such acceptance will not be considered by Engineer until after the Effective Date of the Agreement. The procedure for submittal

of any such application by Contractor and consideration by Engineer is set forth in the General Conditions which may be supplemented in the General Requirements.

13.02 Refer to Section 01330, Submittals and Acceptance for the EWRF Lift Station Force Main Relocation and Section 1300, Submittals for the EWRF Reaeration Blower Replacement of the General Requirements for the period of time after the Effective Date of the Agreement during which the Engineer will accept applications for substitute items of material or equipment.

ARTICLE 14 – SUBCONTRACTORS, SUPPLIERS, AND OTHERS

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

14.02 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers and other individuals or entities. Declining to make requested substitutions will not constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to revocation of such acceptance after the Effective Date of the Agreement as provided in Paragraph 6.06 of the General Conditions.

14.03 (Not Used)

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

ARTICLE 15 – PREPARATION OF BID

15.01 A Bid shall be made on the Bid Form bound in the Project Manual. The Bid Form shall not be separated from the Project Manual nor shall the Bid Form be altered in any way.

15.02 All blanks in 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 Bid item listed therein. In the case of optional alternatives

the words “No Bid”, “No Change”, or “Not Applicable” may be entered. Ditto marks shall not be used.

15.03 A Bid shall be executed as stated below.

A. A Bid by an individual shall indicate the Bidder’s name and official address.

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

C. A Bid by a joint venture shall be executed by each joint venturer in the manner indicated on the Bid Form. The official address of the joint venture shall be indicated.

D. A Bid by a corporation shall be executed in the corporate name by an officer of the corporation and shall be accompanied by a certified copy of a resolution of the board of directors authorizing the person signing the Bid to do so on behalf of the corporation. The corporate seal shall be affixed and attested by the secretary or an assistant secretary of the corporation. The state of incorporation and the official corporate address shall be indicated.

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

F. All names shall be printed in ink below the signature.

G. If applicable, the Bid shall contain evidence of Bidder’s authority and qualification to do business in the state where the Project is located.

H. Contractor’s license or registration number, if any, shall be entered in the space provided on the Bid Form.

15.04 The Bid shall contain an acknowledgment of the receipt of all Addenda, the numbers of which shall be filled in at the space provided on the Bid Form.

15.05 Postal and e-mail addresses and telephone number for communications regarding the Bid shall be indicated.

15.06 In addition to the Bid Form, the forms listed in the Required Forms List, which are bound in the Project Manual, shall be submitted with the Bid. Each document shall be executed in the manner described in Paragraph 15.03 unless another manner is indicated.

ARTICLE 16 – BASIS OF BIDS; COMPARISON OF BIDS

16.01 Base Bid with Alternatives

A. Bidder shall submit its Bid on the basis of a lump sum for the Base Bid and shall provide a separate Bid price for each additive alternative described in the Bidding Documents and as provided for on the Bid Form.

B. For determination of the apparent low Bidder, Bids will be compared on the basis of the aggregate amount of the Base Bid, plus the additive alternative Bid prices providing the most features of the Work within the funds determined by the Owner to be available before Bids are opened. If the addition of another alternative Bid price in the listed order of priority would make the aggregate amount exceed such available funds for all Bidders, it will be skipped and the next subsequent alternative Bid price in a lower amount will be added if award thereon can be made within such funds.

C. After the determination of the apparent low Bidder as stated, award in the best interest of the Owner may be made to said Bidder on its Base Bid and any combination of its additive alternative Bids for which Owner determines funds will be available at the time of award, provided that the award on any such combination of Base Bid and additive alternative Bids does not exceed the amount offered by any other Bidder for the same combination.

16.02 (Not Used)

16.03 Discrepancies between words and numerals will be resolved in favor of words. 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.

16.04 (Not Used)

ARTICLE 17 – SUBMITTAL OF BID

17.01 A Bid shall be received no later than the date and time prescribed and at the place indicated in the Invitation To Bid.

17.02 Bid shall be enclosed in an opaque sealed envelope plainly marked on the outside with the Project title, solicitation number, the name and address of the Bidder, and its license or registration number, if applicable. Bid shall be accompanied by Bid security and other required documents.

17.03 If the Bid is sent by mail or other delivery method, the sealed envelope containing the Bid shall be enclosed in a separate envelope plainly marked on the outside with the notation **"Invitation to Bid # 3083-18: "EWRF Lift Station Force Main Relocation and Reaeration Blower Replacement Projects"**. A mailed Bid shall be addressed to:

Procurement – Finance Department
City of Venice – Procurement
401 West Venice Ave., Room #204
Venice, FL, 34285

ARTICLE 18 – MODIFICATION OR WITHDRAWAL OF BID

18.01 Withdrawal Prior to Bid Opening:

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

18.02 Modification Prior to Bid Opening:

A. If a Bidder wishes to modify its Bid, Bidder must withdraw its initial Bid in the manner specified in Paragraph 18.01.A of these Instructions to Bidders and submit a new Bid.

18.03 Withdrawal After Bid Opening

A. After expiration of the period for receiving Bids, no Bid may be withdrawn or modified.

ARTICLE 19 – OPENING OF BIDS

19.01 Bids will be opened at the time and place where Bids are to be submitted and, unless obviously non-responsive, read aloud publicly. An abstract of the Bids will be made available to Bidders after the opening.

19.02 Bids received by mail or otherwise after the date and time specified for the opening of Bids will not be accepted. It will be the Bidder's responsibility to make arrangements for the return of their submittal at their expense.

ARTICLE 20 – DISQUALIFICATION OF BIDDERS

20.01 More than one Bid for the same Work from an individual or entity under the same or different names will not be considered. Reasonable grounds for believing that any Bidder has an interest in more than one Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder has an interest.

ARTICLE 21 – BIDS TO REMAIN SUBJECT TO ACCEPTANCE

21.01 All Bids shall 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 that period.

ARTICLE 22 – EVALUATION OF BIDS AND AWARD OF CONTRACT

22.01 Owner reserves the right to reject any or all Bids, including without limitation the right to reject any or all nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable

inquiry and evaluation, to be not responsible. Owner also reserves the right to waive any informality not involving price, time or changes in the Work.

22.02 Owner reserves the right to reject any Bid not accompanied by specified documentation and Bid security.

22.03 Owner reserves the right to reject any Bid that, in its sole discretion, is considered to be unbalanced or unreasonable as to the amount bid for any lump sum or unit price item.

22.04 In evaluating Bidders, Owner will consider the qualifications of Bidders, whether or not their Bids comply with the prescribed requirements, the alternatives, if any, the lump sum and unit prices, and other data as may be requested in the Bid Form or prior to the Notice of Award.

22.05 Owner may consider the qualifications and experience of Subcontractors, Suppliers, and other individuals or entities proposed for those portions of the Work for which the identity of Subcontractors, Suppliers, and other individuals or entities must be submitted as provided in the Supplementary Conditions.

22.06 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of the Bidders to perform the Work in accordance with the Contract Documents. Owner reserves the right to reject the Bid of any Bidder who does not pass any such evaluation to Owner's satisfaction.

22.07 If a Contract is to be awarded, Owner will award the Contract to the lowest responsive and responsible Bidder who has neither been disqualified nor rejected pursuant to Article 20 of the Instructions to Bidders or this Article 22.

22.08 A notice of intent for award will be posted for review by interested parties in City Hall or on the City's website prior to submission through the appropriate approval process to the appropriate level for final approval of award.

ARTICLE 23 – CONTRACT SECURITIES

23.01 Performance Bond shall be in the form "Construction Performance Bond". Payment Bond shall be in the form "Construction Payment Bond". The amounts of and other requirements for Performance and Payment Bonds are stated in Paragraph 5.01 of the General Conditions. The requirements for delivery of Bonds are stated in Paragraph 2.01 of the General Conditions. Additional requirements may be stated in the Supplementary Conditions.

23.02 (Not Used)

ARTICLE 24 – CONTRACTOR'S INSURANCE

24.01 The requirements for Contractor's insurance are stated in Article 5 of the General Conditions and in the Supplementary Conditions. The requirements for delivery of certificates of insurance and other evidence of insurance are stated in Paragraph 2.01.B of the General Conditions.

24.02 Successful Bidder shall within 15 days from the date of the Notice of Award deliver to Owner, for review and approval, the required policies of insurance. Upon approval, the policies will be returned to the Bidder and Bidder shall submit certificates of insurance and other evidence of insurance to the Owner as stated in the General Conditions.

ARTICLE 25 – SIGNING OF AGREEMENT

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

ARTICLE 26 – NOTICE TO PROCEED

26.01 Issuance of the Notice to Proceed shall be as stated in Article 2 of the General Conditions.

ARTICLE 27 – PARTNERING (Not Used)

ARTICLE 28 – SALES AND USE TAXES

28.01 Refer to the Paragraph SC-6.10 of the Supplementary Conditions for information on Owner's exemption from sales and use taxes on materials and equipment to be incorporated into the Work. Do not include said taxes in Bid.

ARTICLE 29 – LOCAL PREFERENCE

29.01 Unless otherwise noted in the solicitation, preference shall be given to a "local business" in the awarding of any Invitation to Bid (ITB), Request for Proposal (RFP) or Request for Qualifications (RFQ) in accordance with Section 2-217 of the City of Venice's Code. Local preference shall not apply to other types of solicitations unless explicitly stated in the subject solicitation.

29.02 "Local business" means the vendor has paid a local business tax to either Sarasota, Manatee, DeSoto or Charlotte County, whichever county the Bidder is located, if applicable prior to bid submission that authorizes the Bidder to provide the commodities or services to be purchased, and maintains a permanent physical business address located

within the limits of either Sarasota, Manatee, DeSoto or Charlotte County from which the Bidder operates or performs business, and at which at least one full time employee is located.

29.03 In addition, fifty percent (50%) or more of the employees based at the local business location must reside within Sarasota, Manatee, DeSoto or Charlotte County.In the event the local office is not the primary location of the vendor, at least ten percent of the vendor's full-time employees must be based at the local office location, and at least one corporate officer, managing partner or principal owner of the vendor must reside in Sarasota, Manatee, DeSoto or Charlotte County.

29.04 Bidders wishing to be given preference as a local business must submit with their Bid, all of the Local Preference documentation identified in the "Required Forms Section" of the solicitation.

29.05 For local preference to be granted, the name of the company represented on the required forms must be the same as the name on the Local Preference documentation.

29.06 Information regarding Sarasota County's Local Business Tax can be found at www.sarasotataxcollector.governmax.com.

29.07 In case of a Bid submitted by more than one entity, any one of those entities can qualify the Bid for the local preference. Sub-contractors or sub-consultants cannot qualify a Bid for local preference.

ARTICLE 30 – PUBLIC RECORDS/TABULATION

30.01 Bids are not public records, subject to the provisions of Florida State Statutes, Chapters 119 and 120, until such time as notice of a decision or intended decision is provided, or within thirty (30) days after the bid opening, whichever is earlier. A copy of the tabulation results will be forwarded upon receipt of a stamped, self- addressed envelope. An electronic tabulation will be posted on Demand Star at the Internet Website at http://www.demandstar.com/.

ARTICLE 31 – INDEMNIFICATION/HOLD HARMLESS

31.01 The Bidder shall defend, indemnify and hold the Owner, the Owner's representatives or agents, and the officers, directors, agents, employees, and assigns of each harmless for and against any and all claims, demands, suits, judgments, damages to persons or property, injuries, losses or expenses of any nature whatsoever arising directly or indirectly from or out of any negligent act or omission of the Bidder, its sub-consultants and their officers, directors, agents or employees; any failure of the elected firm to perform its services hereunder in accordance with generally accepted professional standards; any material breach of the elected firm representations as set forth in the proposal or any other failure of the elected firm's to comply with the obligations on its part to be performed under this contract.

ARTICLE 32 - PUBLIC ENTITY CRIMES/NON-COLLUSIVE AFFIDAVIT

32.01 Each Bidder shall complete the Non-Collusive Affidavit and the Public Entity Crimes Form and shall submit the forms with the submittal. Owner considers the failure of the Bidder to submit these documents to be a major irregularity and may be cause for rejection of their submittal.

32.02 A person or affiliate who has been placed on the convicted vendor list following a conviction for a public entity crime may not submit a response on a contract to provide any goods or services to a public entity, may not submit a response on a contract with a public entity for the construction or repair of a public building or public work, may not submit responses on leases of real property to a public entity, may not be awarded or perform work as a Bidder, supplier, Sub-Bidder, or consultant under a contract with any public entity, and may not transact business with any public entity in excess of the threshold amount provided in Section 287, for CATEGORY TWO for a period of 36 months from the date of being placed on the convicted vendor list.

32.03 Termination for Cause: Any Agreement with the Owner obtained in violation of this Section shall be subject to termination for cause. A Sub-Bidder who obtains a subcontract in violation of this Section shall be removed from the Project and promptly replaced by a Sub-Bidder acceptable to the City.

ARTICLE 33 – GRATUITIES AND KICKBACKS

33.01 Gratuities: It is unethical for any person to offer, give, or agree to give any employee or for any employee to solicit, demand, accept or agree to accept from another person, a gratuity or an offer of employment in connection with any decision, approval, disapproval, recommendation, preparation of any part of program requirement or a purchase request, influencing the content of any specification or procurement standard, rendering of advice, investigation, audit, or in any other advisory capacity in any proceeding or application, request for ruling, determination claim or controversy, or other particular matter, pertaining to any program requirement or an Agreement or subcontract, or to any solicitation or proposal therefore.

33.02 Kickbacks: It shall be unethical for any payment, gratuity, or offer of employment to be made by or on behalf of a Sub-Bidder under a Contract to Bidder or higher tier Sub-Bidder any person associated therewith, as an inducement of the award of a subcontract or order.

33.03 Contract Clause: The prohibition against gratuities and kickbacks prescribed in this section shall be conspicuously set forth in every Contract and subcontract and solicitation therefore.

ARTICLE 34 – EQUAL EMPLOYMENT OPPORTUNITY

34.01 Bidder shall be in compliance with Executive Order 11426 Equal Opportunity as amended by Executive Order 11375, and as supplemented by the Department of Labor Regulations

as applicable.

ARTICLE 35 – CONFLICT OF INTEREST

35.01 No employee of an agency acting in his or her official capacity as a purchasing agent, or public officer acting in his or her official capacity, shall either directly or indirectly purchase, rent, or lease any realty, goods, or services for his or her own agency from any business entity of which the officer or employee or the officer's or employee's spouse or child is an officer, partner, director, or proprietor or in which such officer or employee or the officer's or employee's spouse or child, or any combination of them, has a material interest. Nor shall a public officer or employee, acting in a private capacity, rent, lease, or sell any realty, goods, or services to the officer's or employee's own agency, if he or she is a state officer or employee, or to any political subdivision or any agency thereof, if he or she is serving as an officer or employee of that political subdivision. The foregoing shall not apply to district offices maintained by legislators when such offices are located in the legislator's place of business or when such offices are on property wholly or partially owned by the legislator. This subsection shall not affect or be construed to prohibit contracts entered into prior to:

- October 1, 1975
- Qualification for elective office
- Appointment to public office
- Beginning public employment

ARTICLE 36 – DRUG FREE WORKPLACE

36.01 The Owner has adopted a policy in observation of the Drug Free Work Place Act of 1988. Therefore, it is unlawful to manufacture, distribute, disperse, possess, or use any controlled substance in the Owner's workplace. The Owner requests the attached Drug Free Workplace Affidavit to accompany your response. This form has been adopted by the Owner in accordance with the Drug Free Workplace Act. The Owner will not disqualify any respondent who does not concur with the affidavit. The Drug Free Workplace Affidavit is primarily used as tiebreaker when two or more separate entities have submitted proposals at the same price, terms and conditions.

ARTICLE 37 – APPLICABLE LAWS

37.01 Interested parties are advised that all Owner contracts and/or documentation pertinent to this solicitation are subject in full or in part to all legal requirements provided in applicable City Ordinances, State Statutes, and Federal Regulations. Uniform Commercial Code, Chapter 672, Florida State Statutes shall prevail, as the basis for contractual obligations between the Bidder and the Owner for any terms and conditions not specifically stated within the context of this contract.

ARTICLE 38 – DISCLOSURE – PUBLIC OFFICER, PUBLIC EMPLOYEE OR ADVISORY BOARD MEMBER OF OWNER

38.01 Sections 112.313(3) and 112.313(7), Florida Statutes, prohibit any public officer, employee, or advisory board member of the Owner from holding any employment or contractual relationship with any business entity doing business with the Owner. Section 112.313(12) provides that a public officer, employee, or advisory board member will not be in violation of the prohibition if all three of the following conditions are met. The filing of the disclosure form with the Supervisor of Elections is the sole responsibility of the Proposer and must be filed prior to or at the time of submission of the proposal. A copy of the filed disclosure form shall be submitted as part of the proposal.

38.02 Bid is awarded under a sealed, competitive Bid to lowest or best Bidder system. Advisory board member is required to, prior to or at the time of the submission of the Bid, file a statement with the Supervisor of Elections, disclosing his interest and the nature of the intended business. The form is entitled "Form 3A Interest in Competitive Proposal for Public Business," a copy of which is available from the Owner's Procurement- Finance Department.

38.03 The public officer, employee, or advisory board member, spouse, or child is required to have in no way used or attempted to use his influence to persuade a member of the Owner or any of its personnel to enter into such a contract other than by the mere submission of the Bid.

38.04 The public officer, employee, or advisory board member, spouse, or child is required to have in no way participated in the determination of the Bid specifications or the determination of the lowest or best Bidder.

ARTICLE 39 – BID PROTESTS

39.01. In any case where a bidder wishes to protest either the results of, or the intended disposition of any bid, the bidder must:

A. File a written notice to the city manager of the bidder's intention to protest within one business day of the bid opening or the city's declaration of intent with regard to the disposition. Upon receipt of a protest, the bid process shall be suspended until the protest procedure herein described has been completed.

B. Within five days of filing the written notice of intent to protest, the protester shall file a formal written protest with the city manager, acting as the bid protest officer, explaining in detail the nature of the protest and the grounds on which it is based. During this five-day period, the protester is encouraged to attempt to resolve the issue with the finance department.

C. The protester must include with the formal written protest a bid protest bond in the form

of a certified check, cashier's check or money order made payable to the city in an amount equal to five percent of the lowest acceptable bid or $5,000.00 whichever is less. The bond will be deposited with the cashier's office where it will be put into an account and the protester will receive a receipt.

39.02 Upon timely receipt of the formal written protest and protest bond:

A. The bid protest officer shall issue formal findings of fact and a written decision with regard to the validity or nonvalidity of the formal written protest within ten business days of the city's receipt of the protest.

B. Within two business days of receipt of the formal findings of fact and written decision, the city shall notify the protester of the decision of the bid protest officer. Such notification shall be transmitted via certified return receipt mail.

39.03 Should the protest be found to be without merit or validity, the bid protest bond shall be forfeited to the city in its entirety, and the bid process may resume. If a decision favorable in whole or in part to the protest is rendered, a check for the full amount of the bond will be returned to the protester.

ARTICLE 40 – SCRUTINIZED COMPANIES

40.01 Pursuant to Section 287.135, F.S., a company that, at the time of bidding or submitting a proposal for a new contract or renewal of an existing contract, is on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, created pursuant to Section 215.473, F.S., is ineligible for, and may not bid on, submit a proposal for, or enter into or renew a contract with an agency or local governmental entity for goods or services of $1 million or more. Any contract with an agency or local governmental entity for goods or services of $1 million or more entered into or renewed on or after July 1, 2011, must contain a provision that allows for the termination of such contract at the option of the awarding body if the company is found to have submitted a false certification as provided under Subsection 287.135(5), F.S., or has been placed on either of the aforementioned lists. The Owner agrees to comply with the requirements of Section 287.135, F.S. in connection with the implementation of the Project.

Engineer:

EWRF Lift Station Force Main Relocation	EWRF Reaeration Blower Replacement
Jones Edmunds & Associates, Inc.	Hazen and Sawyer
7230 Kyle Court	7334 Delainey Court
Sarasota, Florida 34240	Sarasota, Florida 34240

+ + END OF INSTRUCTIONS TO BIDDERS + +

BID FORM

CITY OF VENICE
EWRF LIFT STATION FORCE MAIN AND REAERATION BLOWER REPLACEMENT PROJECTS

TABLE OF ARTICLES

1. Bid Recipient
2. Bidder's Acknowledgements
3. Bidder's Representations
4. Bidder's Certifications
5. Basis of Bid
6. Time of Completion
7. Attachments to this Bid
8. Defined Terms
9. Bid Submittal
10. Required Forms

ARTICLE 1 - BID RECIPIENT

1.01 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an AGREEMENT with OWNER in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the price(s) and within the times indicated in this Bid and in accordance with the Bidding Documents.

ARTICLE 2 - BIDDER'S ACKNOWLEDGEMENTS

2.01 Bidder accepts all of the terms and conditions of the Advertisement or Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 90 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of OWNER. Bidder will sign the AGREEMENT and will furnish the required contract security, and other required documents within the time periods set forth in the Bidding Documents.

ARTICLE 3 - BIDDER'S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

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

Addendum No.	Date Received	Addendum No.	Date Received
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

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

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

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

E. Bidder has obtained and carefully studied (or accepts the consequences for not doing so) all additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the Site which may affect cost, progress or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents to be employed by Bidder, and safety precautions and programs incident thereto.

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

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

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

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

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

3.02 Bidder further represents that:

A. this Bid is genuine and is not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation;

B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; Bidder has not solicited or induced any individual or entity to refrain from bidding;

C. Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over OWNER; and

D. No person or persons acting in any official capacity for the OWNER are directly or indirectly interested in this Bid, or in any portion of the profit thereof.

ARTICLE 4 – BIDDER'S CERTIFICATIONS

4.01 Bidder certifies that:

A. this Bid is genuine and is not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation;

B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid

C. Bidder; has not solicited or induced any individual or entity to refrain from bidding; and

D. Bidder has not engaged in corrupt, fraudulent, collusive or coercive practices in competing for the Contract. For the purposes of the Paragraph 4.01.D;

1. Corrupt practice" means the offering, giving, or soliciting of anything 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 to 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.

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):

EWRF LIFT STATION FORCE MAIN RELOCATION BID SCHEDULE					
ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
1	Mobilization/Demobilization	LS	1	$	$
2	**DEMOLITION AND TEMPORARY ACCESS**				
2a	Remove Stairway and Protect for Relocation	LS	1	$	$
2b	Demolish Stairway Slab	LS	1	$	$
2c	Provide Temporary Stairway	LS	1	$	$
3	**PIPE, FITTINGS, AND VALVES**				
3a	12" DI Flanged Pipe	LF	43	$	$
3b	12" DI MJ Pipe	LF	95	$	$
3c	12" 22.5-Degree Bend	EA	2	$	$
3d	12" 45-Degree Bend	EA	4	$	$
3e	12" 90-Degree Bend	EA	4	$	$
3f	12" Tee	EA	1	$	$
3g	12" Sleeve	EA	1	$	$
3h	12" Plug Valve	EA	1	$	$
4	**STRUCTURAL**				
4a	Stairway Slab	LS	1	$	$
4b	Pipe Support Slab	LS	1	$	$
4c	Stairway Landing	LS	1	$	$
4d	Relocate Stairway	LS	1	$	$
4e	Sidewalk	LS	1	$	$
4f	Pipe Supports				
4f1	Pipe Support #1	EA	1	$	$
4f2	Pipe Support #2	EA	1	$	$
5	Owner's Allowance	Allowance			$ 15,000.00
	TOTAL (ITEMS 1 through 5, inclusive)				**$**

Total Base Bid (Sum of Items 1 through 3, inclusive) **$** _____

(in numbers)

Total Base Bid in Words (Sum of Items 1 through 3, inclusive)

$ _____

Bidder agrees to furnish and install equipment from the above circled manufacturers in accordance with the provisions and under the terms of the Contract Documents.

NAME OF BIDDER:_____

BIDDER'S SIGNATURE:_____

CURRENT LICENSE NUMBER:_____

DATE:_____

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CITY OF VENICE EASTSIDE WATER RECLAMATION FACILITY
REAERATION BLOWER REPLACEMENT

Item	Description	Quantity	Unit	Total Price (In Numbers)
1	Mobilization	1	LS	
2	Demobilization	1	LS	
3	Site Work and Erosion Control	1	LS	
4	Blower Replacement	1	LS	
5	Maintenance of Operations/Temporary Blower System	1	LS	
6	Demolition	1	LS	
7	Blower Piping Improvements	1	LS	
8	Electrical Systems	1	LS	
9	Controls and Integration Improvements	1	LS	
Base Bid Subtotal				$
Contractor Bonds and Insurance (maximum of 5% of base bid subtotal)				$
Owner's Allowance				$ 40,000
Permit Allowance				$ 1,000

Total Base Bid (Sum of All Items) **$ _____.**
(in numbers)

Total Base Bid in Words (Sum of All Items)

$ _____.

Bidder agrees to furnish and install equipment from the above circled manufacturers in accordance with the provisions and under the terms of the Contract Documents.

NAME OF BIDDER:_____

BIDDER'S SIGNATURE:_____

CURRENT LICENSE NUMBER:_____

DATE:_____

Bid Form Summary

Total Base Bid- EWRF Lift Station Force Main Relocation: $_____

Total Base Bid- EWRF Reaeration Blower Replacement: $_____

Total Bid: $_____

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

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

5.06 All specified cash allowances are included in the price(s) set forth above and have been completed in accordance with Paragraph 11.02 of the General Conditions.

ARTICLE 6 - TIME OF COMPLETION

6.01a EWRF Lift Station Force Main Relocation Bidder agrees that the Work will be substantially complete within 90 calendar days after the date when the Contract Times commence to run as provided in Paragraph 2.03 of the General Conditions, and will be completed and ready for final payment in accordance with paragraph 14.07.B of the General Conditions within 120 calendar days after the date when the Contract Times commence to run, which days will be entered by OWNER into the AGREEMENT as the Contract Times.

6.01b EWRF Reaeration Blower Replacement Bidder agrees that the Work will be substantially complete within 165 calendar days after the date when the Contract Times commence to run as provided in Paragraph 2.03 of the General Conditions, and will be completed and ready for final payment in accordance with paragraph 14.07.B of the General Conditions within 195 calendar days after the date when the Contract Times commence to run, which days will be entered by OWNER into the AGREEMENT as the Contract Times.

6.02 Bidder accepts the provisions of the AGREEMENT as to liquidated and special damages, if any, in the event of failure to complete the Work within the Contract Times.

ARTICLE 7 - ATTACHMENTS TO THIS BID

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

A. Required Bid security.

B. Required Bidder Qualifications Statement with supporting data.

C. Miscellaneous Bid Forms

ARTICLE 8 - DEFINED TERMS

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

ARTICLE 9 - BID SUBMITTAL

9.01 This Bid submitted on _____, 20___ by:

If Bidder is:

Individual

Name (Typed or Printed): _____

By_____
(Individual's Signature)

Doing business as_____

License or Registration Number:_____

Business Address:_____

_____

Phone No.:_____Facsimile:_____

A Partnership

Partnership Name: _____

By:_____
(Signature of General Partner - Attach evidence of authority to sign)

(Name (Typed or Printed): _____

License or Registration Number:_____

Business Address:_____

_____

Phone No.:_____Facsimile:_____

A Corporation

Corporation Name: _____

_____
(State of Incorporation)

By_____
(Signature - Attach evidence of authority to sign)

Name and Title (Typed or Printed): _____

(CORPORATE SEAL)

Attest:_____
(Secretary)

License or Registration Number:_____

Business Address:_____

_____

Phone No.:_____Facsimile:_____

Limited Liability Company

By:_____
(Firm Name)

_____
(State of Formation)

By:_____
(Signature of Member/Authorized to Sign)

_____
(Printed or Typed Name and Title of Member Authorized to Sign)
(Attach evidence of authority to sign.)

License or Registration Number:_____

Business Address:_____

_____

Phone No.:_____Facsimile:_____

A Joint Venture

Name of Joint Venture:_____

First Joint Venturer Name: _____

By:_____
(Signature of First Joint Venturer - Attach evidence of authority to sign)

Name (Typed or Printed): _____ _____
(Title)

Title:_____

Second Joint Venturer Name: _____

By:_____
(Signature of Second Joint Venturer - Attach evidence of authority to sign)

Name (Typed or Printed): _____ _____
(Title)

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

Business Address: _____

Phone and FAX number and address for receipt of communications to joint venture:

Phone: _____ Facsimile:_____

ARTICLE 10 – REQUIRED FORMS

Required Forms Check List: ITB# 3083-18: EWRF Lift Station Force Main Relocation and Reaeration Blower Replacement Projects

- Proposal Bond
- Local Preference Form
- Qualifications Statement
- Co-operative Procurement with Other Jurisdictions
- Form 3A- Interest in Competitive Bid for Public Business
- Indemnification/Hold Harmless
- FDEP & U.S. EPA Construction Notices of Intent (NOI)
- Statement of References for Contractor
- Contractor's Statement of Sub-contractors
- Drug Free Workplace Certification
- Non-Collusive Affidavit
- Public Entity Crime Information
- Statement of "No Bid" (if applicable)

All required forms are included in this package. All forms must be filled out and returned with the firm's proposal.

Failure to do so will result in the firm being considered non-responsive and their proposal will be disallowed.

Mark N/A if not applicable to your firm

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PROPOSAL BOND

Not to be completed if a certified check is submitted.

KNOW ALL MEN BY THESE PRESENTS: That we, the undersigned,

_____ as Principal,

and _____ as Surety

are held and firmly bound unto the City of Venice, Florida, in the sum of

_____ $_____, for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

The condition of the above obligation is such that if the attached Proposal of Principal and Surety for work specified as:

_____

all as stipulated in said Proposal, by doing all work incidental thereto, in accordance with the plans and specifications provided heretofore, all within Sarasota County, is accepted and the bidder shall within ten (10) days after notice of said award, enter into a contract, in writing, and furnish the required Performance Bond with surety or sureties to be approved by the Director of Purchasing, this obligation shall be void; otherwise the same shall be in full force and virtue by law and the full amount of this Proposal Bond will be paid to the City as stipulated or liquidated damages.

Signed this _____ day of _____, 20___.

_____	_____
Principal	Surety

Principal must indicate whether corporation, partnership, company, or individual.

The person signing shall, in his own handwriting, sign the Principal's name, his own name, and his title. The person signing for a corporation must, by affidavit, show his authority to bind the corporation.

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"LOCAL PREFERENCE" DETERMINATION

The following questions will help you determine local preference for your company.
Please answer questions 1 through 4 **FIRST**. If you answer **NO** to any questions 1 through 4, local preference does **NOT** apply.
ONLY if you answer **YES** to questions 1 through 4, may you proceed to question 5.
If you answer **YES** to any questions 5 and 6, local preference applies.
If you are unsure of how to answer any questions, please contact the City of Venice's Purchasing Department at 941-486-2626.

Questions 1 – 4

1. Has your company paid a local business tax either to Sarasota, DeSoto or Charlotte County (Manatee County does not currently have a local business tax) authorizing your company to provide goods or services described in this solicitation?

   YES ___ If "yes", proceed to question 2.
   NO ____ If "no", STOP, local preference does not apply.
   ***** If the name on the local business tax receipt is not the same as the name on the bid/solicitation submittal, local preference does not apply.

2. Does your company maintain a permanent physical business address located within the limits of Sarasota, Manatee, DeSoto or Charlotte County from which your company operates or performs business?

   YES ____ If "yes", proceed to question 3.
   NO ____ If "no", STOP, local preference does not apply.

3. Does your company's local business office (identified in question 2) have a least one full time employee?

   YES ____ If "yes", proceed to question 4.
   NO _____ If "no", STOP, local preference does not apply.

4. Do at least fifty percent (50%) of your company's employees who are based in the local business location (identified in question 2) reside within Sarasota, Manatee, DeSoto or Charlotte County?

   YES ____ If "yes", proceed to question 5.
   NO ____ If "no", STOP, local preference does not apply.

Questions 5 – 6

5. Is your company's local business office (identified in question 2) the primary location (headquarters) of your company?

   YES ____ If "yes", STOP, local preference applies.
   NO ____ If "no", proceed to question 6.

6. If the local business office (identified in question 2) is not the primary location of your company, are at least ten percent (10%) of your company's entire full-time employees based at the local office location AND does at least one corporate officer, managing partner or principal owner of your company reside in Sarasota, Manatee, DeSoto or Charlotte County?

YES ____ If "yes", STOP, local preference applies.
NO ____ If "no", local preference does not apply.

QUALIFICATIONS STATEMENT

The undersigned certifies under oath the truth and correctness of all statements and all answers to questions made hereinafter:

SUBMITTED TO: CITY OF VENICE
Procurement- Finance Department
401 W. Venice Avenue
Venice, Florida 34285

CHECK ONE:
- ☐ Corporation
- ☐ Partnership
- ☐ Individual
- ☐ Joint Venture
- ☐ Other

SUBMITTED BY:

NAME: _____
ADDRESS: _____
PRINCIPLE OFFICE: _____

State the true, exact, correct and complete legal name of the partnership, corporation, trade or fictitious name under which you do business and the address of the place of business.

The correct name of the Offeror is: _____

The address of the principal place of business is: _____

If the Offeror is a corporation, answer the following:

a. Date of Incorporation: _____

b. State of Incorporation: _____

c. President's Name: _____

d. Vice President's Name: _____

e. Secretary's Name: _____

f. Treasurer's Name: _____

g. Name and address of Resident Agent: _____

If Offeror is an individual or partnership, answer the following:

a. Date of Organization: _____

b. Name, address and ownership units of all partners:

_____

_____

_____

c. State whether general or limited partnership: _____

If Offeror is other than an individual, corporation partnership, describe the organization and give the name and address of principals:

_____

_____

_____

_____

_____

If Offeror is operating under fictitious name, submit evidence of compliance with the Florida Fictitious Name Statute.

How many years has your organization been in business under its present business name?

_____

a. Under what other former names has your organization operated?

_____

_____

_____

_____

ACKNOWLEDGEMENT

State of _____

County of _____ } SS.

On this the _____ day of _____, 20___, before me, the undersigned Notary Public of the State of _____, personally appeared _____ and (Name(s) of individual(s) who appeared before notary) whose name(s) is/are Subscribed to the within instrument, and he/she/they acknowledge that he/she/they executed it.

_____

NOTARY PUBLIC, STATE OF _____

NOTARY PUBLIC
SEAL OF OFFICE:

_____

(Name of Notary Public: Print, stamp, or type as commissioned)

☐Personally known to me, or ☐Produced Identification: _____ ☐ **DID** take an oath, or ☐**DID NOT** take an oath

COOPERATIVE PROCUREMENT WITH OTHER JURISDICTIONS

The vendor, by submitting a bid, authorizes other Public Agencies to "Piggy-Back" or purchase equipment or services being proposed in this invitation to bid at prices bid unless otherwise noted on the proposal sheet.

Yes_____ No_____

. **AUTHORIZED SIGNATURE**

By submission of the ITB, the undersigned certifies that:

1. He/She has not paid or agreed to pay any fee or commission, or any other thing of value contingent upon the award of this contract, to any City of Venice, Florida employee or official or to any current consultant to the City of Venice, Florida;
2. He/She has not paid or agreed to pay any fee or commission or any other thing of value contingent upon the award of this contract to any broker or agent or any other person;
3. The prices contained in this proposal have been arrived at independently and without collusion, consultation, communication or agreement intended to restrict competition.
4. He/She has the full authority of the Offeror or to execute the proposal and to execute any resulting contract awarded as the result of, or on the basis of, the proposal.

Authorized Representative: _____

Signature: _____

Title: _____

Company Name: _____

Address: _____

City, State, ZIP: _____

Telephone Number: _____

Fax Number: _____

E-mail address: _____

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FORM 3A INTEREST IN COMPETITIVE BID FOR PUBLIC BUSINESS

LAST NAME — FIRST NAME — MIDDLE INITIAL	OFFICE / POSITION HELD
MAILING ADDRESS	AGENCY
CITY ZIP COUNTY	ADDRESS OF AGENCY

WHO MUST FILE THIS STATEMENT

Sections 112.313(3) and 112.313(7), Florida Statutes, prohibit certain business relationships on the part of public officers and employees, their spouses, and their children. *See* Part III, Chapter 112, Florida Statutes, and/or the brochure entitled "A Guide to the Sunshine Amendment and Code of Ethics for Public Officers and Employees" for more details on these prohibitions. However, Section 112.313(12), Florida Statutes, provides certain limited exemptions to the above-referenced prohibitions, including one where the business is awarded under a system of sealed, competitive bidding; the public official has exerted no influence on bid negotiations or specifications; AND where disclosure is made, prior to or at the time of the submission of the bid, of the official's or his spouse's or child's interest and the nature of the intended business. This form has been promulgated by the Commission on Ethics for such disclosure, *if and when applicable* to a public officer or employee.

INTEREST IN COMPETITIVE BID FOR PUBLIC BUSINESS *(Required by § 112.313(12)(b), Fla. Stat.)*

1. The competitive bid to which this statement applies has been / will be (strike one) submitted to the following government agency:

2. The person submitting the bid is: **NAME ▼** **POSITION ▼**

3. The business entity with which the person submitting the bid is associated is:

4. My relationship to the person or business entity submitting the bid is as follows:

5. The nature of the business intended to be transacted in the event that this bid is awarded is as follows:

   a. The realty, goods, and / or services to be supplied specifically include:_____

   b. The realty, goods, and / or services will be supplied for the following period of time:_____

   c. Will the contract be subject to renewal without further competitive bidding? ☐ Yes ☐ No. If so, how often?

6. Additional comments:

7. SIGNATURE	DATE SIGNED	DATE FILED

FILING INSTRUCTIONS

If you are a state officer or employee required to disclose the information above, please file this form with the Department of State in Room 316, R.A. Gray Building, 500 South Bronough Street, Tallahassee, Florida 32399-0250. If you are an officer or employee of a political subdivision of this state and are subject to this disclosure, please file the statement with the Supervisor of Elections of the county in which the agency in which you are serving has its principal office.

NOTICE: UNDER PROVISIONS OF FLORIDA STATUTES §112.317, A FAILURE TO MAKE ANY REQUIRED DISCLOSURE CONSTITUTES GROUNDS FOR AND MAY BE PUNISHED BY ONE OR MORE OF THE FOLLOWING: IMPEACHMENT, REMOVAL OR SUSPENSION FROM OFFICE OR EMPLOYMENT, DEMOTION, REDUCTION IN SALARY, REPRIMAND, OR A CIVIL PENALTY NOT TO EXCEED $10,000.

CE FORM 3A — REV. 1-95

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INDEMNIFICATION/HOLD HARMLESS

The elected firm shall (if required by City) defend, indemnify and hold the City, the City's representatives or agents, and the officers, directors, agents, employees, and assigns of each harmless for and against any and all claims, demands, suits, judgments, damages to persons or property, injuries, losses or expenses of any nature whatsoever (including attorneys' fees at trial at appellate level) arising directly or indirectly from or out of any negligent act or omission of the elected firm, its Sub-Offerors and their officers, directors, agents or employees; any failure of the elected firm to perform its services hereunder in accordance with generally accepted professional standards; any material breach of the elected firm's representations as set forth in the proposal or any other failure of the elected firm to comply with the obligations on its part to be performed under this contract.

I, _____, being an authorized representative of the firm of

_____ located at City

_____, State _____, Zip Code _____ Phone:

_____ Fax: _____. Having read and

understood the contents above, hereby submit accordingly as of this Date,

_____, 20__.

_____
Please Print Name

_____
Signature

This signed document shall remain in effect for a period of one (1) year from the date of signature or for the contract period, whichever is longer.

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CITY OF VENICE, FLORIDA
FDEP & U.S. EPA CONSTRUCTION NOTICES OF INTENT (NOI)

The undersigned bidder acknowledges the requirement of the U.S. Environmental Protection Agency (EPA) and the Florida Department of Environmental Protection (FDEP) which have published the rules for NPDES General Permits for stormwater discharges from construction sites and said bidder agrees to assist the owner in the preparation of these permits and associated plans. The bidder acknowledges that he has taken these permits and associated construction costs into account in the preparation of his lump sum bid. These permits are mandated under Section 402(p) of the Clean Water Act for "Stormwater Discharge from Construction Activities (including clearing, grading, and excavation activities) that result in the disturbance of five (5) or more acres total land area, including areas that are part of a larger common plan of development or sale." The EPA has published summary guidance for: "Developing Prevention Plans and Best Management Practices" (EPA 833-R-92-001, October 1992).

The EPA permit format is a *Notice of Intent (NOI) for Stormwater Discharges Associated with Construction Activity to be covered under a NPDES Permit*, and it is to be submitted according to the NOI instructions. The Stormwater Pollution Prevention Plan which must accompany the NOI must be signed by authorized representatives of the contractor and subcontractors as well as the facility Owner. Copies of the EPA NOI must be provided to state and local agencies who have issued stormwater management, grading, or land alteration permits or approvals.

An NOI must also be submitted to the Florida Department of Environmental Protection, NPDES Stormwater Notices Center, MS 2510, 2600 Blair Stone Road, Tallahassee, FL 32399. FDEP forms may be downloaded from the State's web site http://www.dep.state.fl.us/water/stormwater/npdes/ or phone 850-921-9870 if you have questions.

Acceptance of the bid to which this certification and disclosure applies in no way represents the Owner or its Representative has evaluated and thereby determined that the information is adequate to comply with the applicable U.S. EPA or FDEP requirements nor does it in any way relieve the contractor of its sole responsibility to comply with the applicable U.S. EPA and FDEP requirements, including inspection of all control measures at least once each week and following any storm (rainfall) event of 0.5 inches or greater and maintaining reports of each inspection.

Bidder (Company): _____

Name and Title: _____

Address: _____

_____

Telephone: _____

BY SIGNATURE BELOW OF AUTHORIZED REPRESENTATIVE, CONTRACTOR ACKNOWLEDGES RECEIPT OF A COPY OF CITY ORDINANCES 95-12 and 96-09 AND AGREES TO ABIDE BY THE REQUIREMENTS OF SAID ORDINANCES.

THIS PAGE MUST BE COMPLETED & SUBMITTED WITH OFFER

Signature:_____ **Date:**_____
Printed name/title:

ORDINANCE 95-12

AN ORDINANCE OF THE CITY OF VENICE, FLORIDA, AMENDING THE CODE OF ORDINANCES BY AMENDING CHAPTER 9, HEALTH AND SANITATION, ARTICLE IV, DISPOSAL OF EXCRETA, SECTION 9-71, DISCHARGE OF RAW SEWAGE INTO STORMWATER; DELETING ARTICLE V, PROHIBITED STORMWATER DISCHARGES; ADDING CHAPTER 19, WATER AND SEWERS, ARTICLE VI, STORMWATER QUALITY; DELETING CHAPTER 15, STREETS AND SIDEWALKS, ARTICLE IV, EXCAVATIONS, SECTION 15-53, STORM DRAINAGE AND POLLUTION; PROVIDING FOR CONFLICT WITH OTHER ORDINANCES; PROVIDING FOR A SEVERABILITY CLAUSE AND PROVIDING AN EFFECTIVE DATE.

WHEREAS, control of stormwater runoff is necessary from individual lots that do not require a permit from the Southwest Florida Water Management District and requiring compliance with the provisions of the Clean Water Act 33 U.S.C.1251 et.seq., as amended by the Water Quality Act of 1987; and

WHEREAS, the City is desirous of complying with its U.S. Environmental Protection Agency National Pollutant Discharge Elimination System Permit and its Stormwater Master Plan, therefore, stormwater runoff and any discharge to the City storm sewer system will be closely monitored and regulated; and

WHEREAS, the control of stormwater runoff is the responsibility of each individual property owner; and

WHEREAS, the City is desirous of controlling stormwater runoff and insuring compliance with the Comprehensive Plan.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF VENICE, FLORIDA:

SECTION 1. Chapter 9, Water and Sewers, Article IV, Disposal of Excreta, Section 9-71, Discharge of Raw Sewage into Storm Sewer, is amended to read as follows:

Sec. 9-71. Discharge of raw sewage into storm sewer.

It shall be unlawful for any person to discharge raw sewage or to discharge the effluent of and from any septic tank into the storm sewer system of the city or to construct or maintain any system of drainage, pipes, conduits or other apparatus whereby raw sewage or the effluent of and from any septic tank shall or may be discharged into or through the storm sewer system of the city.

SECTION 2. Chapter 9, Water and Sewers, Article V, Prohibited Stormwater Discharges, is deleted in its entirety.

SECTION 3. Chapter 19, Water and Sewers, Article VI, Stormwater Quality is added to read as follows:

ARTICLE VI. STORMWATER QUALITY

Sec. 19-141. Definitions.

As used in this article "industrial stormwater" means stormwater runoff from a site with industrial activities, as defined under 40 CFR Section 122.26(a)(14) U.S. Environmental Protection Agency regulation.

As used in this article "construction sites" refers to all sites.

As used in this article, "illicit discharge" is any discharge of anything other than stormwater to the municipal separate storm sewer system (MS4) or the waters of the State of Florida or the United States.

As used in this article "industrial wastewater" refers to liquids used by an entity in their course of business, that if discharged to the MS4, would degrade the quality of stormwater.

Sec. 19-142. Disposal of industrial stormwater discharges.

The following types of discharges to the municipal separate storm sewer of the city must be controlled as indicated.

(1) **Industrial wastewater/illicit discharge**: Industrial wastewater/illicit discharge may not be discharged to the city's municipal separate storm sewer system.

(2) **Industrial stormwater**: As required to comply with NPDES regulations, the quality of industrial stormwater which is discharged through the city's municipal separate storm sewer system may be subject to regulation or permitting, and any violation of such regulation or permit may be subject to an order to immediately cease such

discharge.

Sec. 19-143. Runoff stormwater and Best Management Practice (BMPs) for construction sites.
BMPs shall be implemented as necessary, to insure that all discharges from construction activities are in compliance with the City of Venice EPA/NPDES Stormwater Permit and the Stormwater Master Plan, or the SWFWMD Permit or EPA's NPDES Construction Activity General Permit, whichever is most stringent in its requirements.
Best Management Practices include but are not limited to, the following requirements:
(a) All site grading shall be conducted in such a manner that all stormwater management facilities located adjacent to the site are not altered in any way which will diminish their designated flow or pollutant removal capacity or the shape of the drainage facility.
(b) Maintenance of vegetative buffers or use of a silt fence and/or staked hay bales which minimize erosion and retain sediment on site, shall be implemented prior to any construction activities taking place at sites which discharge to surface water or the municipal separate storm sewer system (MS4). These controls, when utilized, shall be secured and properly maintained during construction activities until the site has been stabilized with sod and/or seed and mulch. A double silt fence may be required as an additional measure to insure that discharges from the site are in compliance with water quality standards as established by the EPA/NPDES Stormwater Permit. Undisturbed vegetative buffers shall be maintained intact to the maximum extent possible to reduce erosion and the discharge of sediment from stormwater runoff. All areas of exposed soil shall be stabilized within 72 hours of attaining final grade.
(c) Storm sewer systems (eg. inlets, pipes and ditches, etc.) adjacent to the site must be protected by a silt fence and/or staked hay bales during construction, to keep solids from entering conveyance systems.
(d) Vehicles such as concrete or dump trucks and other construction equipment shall not be washed at locations where the runoff will flow directly into a lake, wetland, watercourse or stormwater conveyance system. Special areas must be designated for washing vehicles. In all new subdivisions, a wash area may be established by the owner/developer which can be used by the site contractor and home builders. If established, wash areas shall be located where the wash water will spread out and evaporate or infiltrate directly into the ground, or where the runoff can be collected in a temporary holding or seepage basin. Gravel or rock bases are recommended for temporary holding or seepage basins, to minimize mud generation. Underdrains shall be installed where infiltration basins are provided as required by the owner/developer's engineer or the Southwest Florida Water Management District. Upon completion of the project, the wash areas shall be graded and stabilized and any trash or waste shall be collected and disposed of properly.
(e) Fuel, chemicals, cements, solvents, paints, topsoil, or other potential water pollutants shall be stored in areas where they will not cause runoff pollution. Toxic chemicals and materials, such as pesticides, paints, and acids, must be stored in accordance with manufacturer's guidelines. Groundwater resources shall be protected from leaching by placing a plastic mat, packed clay, tar paper, or other impervious material on any areas where toxic liquids are to be opened and stored.
(f) A minimum of one permitted driveway must be established prior to construction and shall be used as the only access for ingress/egress during construction in order to provide minimum disturbance of drainage facilities and vegetative cover on site.

Sec. 19-44. Owner responsibility for stormwater runoff.
(a) The control of stormwater runoff is the responsibility of each individual property owner.
(b) Any property owner constructing or causing to be constructed any building which requires an elevated slab and the elevation of the building pad is higher than that of adjoining properties, will control stormwater runoff during construction. Likewise, any property that is filled more than twelve inches above the adjacent property must provide additional control measures for stormwater during construction. Upon completion of the work, all stormwater runoff shall flow to its natural preconstruction drainage swale, ditch, etc., or be retained in a retention or detention pond(s) designed and constructed for that purpose.
(c) For any construction where the elevation of the building pad or site fill will be higher than adjoining properties, construction plans certified by a professional engineer registered with the State of Florida, retained by the property owner, will be provided to the City prior to issuance of a building permit.
(d) Any single lot not covered under Southwest Florida Water Management District rules, exceeding forty-five percent in impervious coverage (including buildings, drives, sidewalks, patios, etc.) shall require stormwater retention facilities to be designed by a Florida registered engineer. The design is to meet the City of Venice EPA/NPDES Permit requirements for quantity and quality of treatment.
(e) The property owner's engineer will be required to certify to the City Engineer that construction was completed in accordance with the certified plans, prior to issuance of a Certificate of Occupancy.

(f) All improvements to property affecting stormwater drainage must be done in compliance with the City's Comprehensive Plan.

Sec. 19-145. Illicit discharges.
It shall be unlawful for any person to discharge anything other than stormwater into the city's municipal separate storm sewer system whether such discharges occur through piping connections, runoff, exfiltration, infiltration, seepage, or leaks. No person may maintain, use, or establish any direct or indirect connection to any storm sewer owned by the city that results in any discharge in violation of any provision of federal, state, city, or other law or regulation. This provision is retroactive to January 1, 1995, and applies to connections made prior to the effective date of this provision, regardless of whether made under a permit, or other authorization, or whether permissible under laws or practices applicable or prevailing at the time the connection was made.

No materials other than those composed entirely of stormwater shall be disposed of, dumped, or spilled into the city's municipal separate storm sewer system, whether such materials are in a solid or liquid form.

Sec. 19-146. Inspections.
It shall be the duty of the city engineer or designee to carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance with this article.

SECTION 4. Chapter 15, Streets and Sidewalks, Article IV, Excavations, Section 15-53, Storm Drainage and Pollution, is deleted in its entirety.

SECTION 5. To the extent of any conflict between the provisions of this Ordinance, and any other Ordinance, Resolution, or Agreement of the City of Venice, Florida, the provisions of this Ordinance shall prevail.

SECTION 6. Severability. If for any reason a provision of this Ordinance or the application thereof to any person, group of persons, or circumstances is held invalid, the invalidity shall not effect other provisions or applications of the Ordinance which can be given effect without the invalid provision or application, and to this end the provisions of the Ordinance are severable.

SECTION 7. Effective Date. This Ordinance shall take effect immediately upon its adoption, as required by law.

PASSED BY THE COUNCIL OF THE CITY OF VENICE, FLORIDA, THIS 23RD DAY OF MAY, 1995.
First Reading: May 9, 1995 - Final Reading: May 23, 1995 - ADOPTION: May 23, 1995
ATTEST: /s/LORI STELZER, CMC,CITY CLERK /S/ MERLE L. GRASER, MAYOR

I, LORI STELZER, City Clerk of the City of Venice, Florida, a municipal corporation in Sarasota County, Florida, do hereby certify that the foregoing is a full and complete, true and correct copy of an Ordinance duly adopted by the Venice City Council, at a meeting thereof duly convened and held on the 23rd day of May, 1995, a quorum being present.

WITNESS my hand and the official seal of said City this 24th day of May, 1995.

/S/ LORI STELZER, CMC, CITY CLERK Approved as to form: /S/ ROBERT C. ANDERSON, CITY ATTORNEY

ORDINANCE 96-09

AN ORDINANCE OF THE CITY OF VENICE, FLORIDA, AMENDING THE CODE OF ORDINANCES BY AMENDING CHAPTER 19, WATER AND SEWERS, ARTICLE VI, STORMWATER QUALITY, SECTION 19-141, DEFINITION FOR INDUSTRIAL STORMWATER, SECTION 19-146, INSPECTIONS, PROVIDING FOR CONFLICT WITH OTHER ORDINANCES; PROVIDING FOR A SEVERABILITY CLAUSE AND PROVIDING AN EFFECTIVE DATE.

WHEREAS, the City of Venice is responsible for the conservation, management, protection, control, use and enhancement of stormwater within its corporate limits, and for the acquisition, management, maintenance, extension, and improvement of the stormwater systems in the City; and

WHEREAS, the Environmental Protection Agency/National Pollutant Discharge Elimination System (EPA/NPDES) permit requires certain amendments to the existing Ordinance and extension of inspection authority on private properties.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF VENICE, FLORIDA:

SECTION 1. Chapter 19, Water and Sewers, Article VI, Stormwater Quality, Section 19-141, Definition, for Industrial Stormwater is amended to read as follows:

Sec. 19-141. Definitions.

As used in this article, "industrial stormwater" means stormwater runoff from a site with industrial activities, as defined under 40 CFR Section 122.26 (~~a~~) (b) (14), U.S. Environmental Protection Agency regulation.

SECTION 2. Chapter 19, Water and Sewers, Article VI, Stormwater Quality, Section 19-146, Inspections, is amended to read as follows:

Sec. 19-146. Inspections.

It shall be the duty of the city engineer or designee to carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance with this article. The city engineer or his duly authorized agents may enter at all reasonable times in or upon any private or public property for the purpose of inspecting and investigating conditions and practices which may be a violation of this ordinance, regulation or permit. The city engineer may, whenever necessary, make an inspection of construction sites to enforce any of the provisions of this ordinance, regulation or permit issued hereunder, or whenever an authorized official has reasonable cause to believe there exists any condition constituting a violation of this ordinance, regulation or permit issued hereunder. The city engineer shall inspect the work and shall require the owner to obtain services to provide adequate on-site inspection. If the city engineer finds that eroded soils are leaving the construction site, the city engineer may direct the owner(s) or his agents or his contractor on the site by written order to install any and all erosion controls that are deemed necessary to prevent said soil erosion from migrating off site. Notwithstanding the existence or pursuit of any other remedy, the City may maintain an action in its own name in any court of competent jurisdiction for an injunction or other process against any person to restrain or prevent violations of this ordinance.

SECTION 3. To the extent of any conflict between the provisions of this Ordinance, and any other Ordinance, Resolution, or Agreement of the City of Venice, Florida, the provisions of this Ordinance shall prevail.

SECTION 4. Severability. If for any reason a provision of this Ordinance or the application thereof to any person, group of persons, or circumstances is held invalid, the invalidity shall not effect other provisions or applications of the Ordinance which can be given effect without the invalid provision or application, and to this end the provisions of the Ordinance are severable.

SECTION 5. Effective Date. This Ordinance shall take effect immediately upon its adoption, as required by law.

PASSED BY THE COUNCIL OF THE CITY OF VENICE, FLORIDA, THIS 26TH DAY OF MARCH, 1996.

First Reading: March 12, 1996 - Final Reading: March 26, 1996 - ADOPTION: March 26, 1996

ATTEST: /s/LORI STELZER, CMC,CITY CLERK /S/ MERLE L. GRASER, MAYOR

I, LORI STELZER, City Clerk of the City of Venice, Florida, a municipal corporation in Sarasota County, Florida, do hereby certify that the foregoing is a full and complete, true and correct copy of an Ordinance duly adopted by the Venice City Council, at a meeting thereof duly convened and held on the 26th day of March, 1996, a quorum being present.

WITNESS my hand and the official seal of said City this 27th day of March, 1996.

/S/ LORI STELZER, CMC, CITY CLERK Approved as to form: /S/ ROBERT C. ANDERSON, CITY ATTORNEY.

STATEMENT OF REFERENCES
FOR CONTRACTOR

NAME OF CONTRACTOR: _____

BUSINESS ADDRESS: _____

How many years have you been engaged in the business under the present firm name? _____

List previous business experience: _____

_____

List at least three construction references:

(1) Person to contact: _____

Company Name: _____

Address: _____

Telephone: _____ Date work performed: _____

(2) Person to contact: _____

Company Name: _____

Address: _____

Telephone: _____ Date work performed: _____

(3) Person to contact: _____

Company Name: _____

Address: _____

Telephone: _____ Date work performed: _____

(4) Person to contact: _____

Company Name: _____

Address: _____

Telephone: _____ Date work performed: _____

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CONTRACTOR'S STATEMENT OF SUBCONTRACTORS TO BE USED FOR THIS WORK

NAME OF CONTRACTOR: _____

BUSINESS ADDRESS: _____

LIST SUBCONTRACTORS TO BE USED IN THE PROJECT:

(1) Company Name: _____

Address: _____

Telephone: _____ Phase of Work Sublet:_____

(2) Company Name: _____

Address: _____

Telephone: _____ Phase of Work Sublet:_____

(3) Company Name: _____

Address: _____

Telephone: _____ Phase of Work Sublet:_____

(4) Company Name: _____

Address: _____

Telephone: _____ Phase of Work Sublet:_____

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DRUG FREE WORKPLACE CERTIFICATION

If identical tie bids exist, preference will be given to the vendor who submits a certification with their bid/proposal certifying they have a drug-free workplace in accordance with Section 287.087, Florida Statutes. The drug-free workplace preference is applied as follows:

IDENTICAL TIE BIDS: Preference shall be given to businesses with drug-free workplace programs. Whenever two or more bids, which are equal with respect to price, quality, and service, are received by the State of by any political subdivision for the procurement of commodities or contractual services, a bid received from a business that certifies that it has implemented a drug-free workplace program shall be given preference in the award process. Established procedures for processing tie bids will be followed if none of the tied vendors have a drug-free workplace program.

As the person authorized to sign this statement, I certify that this firm complies fully with the following requirements:

1) This firm publishes a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the workplace and specifying the actions that will be taken against employees for violations of such prohibition.

2) This firm informs employees about the dangers of drug abuse in the workplace, the business's policy of maintaining a drug-free workplace, any available drug counseling, rehabilitation, and employee assistance programs, and the penalties that may be imposed upon employees for drug abuse violations.

3) This firm gives each employee engaged in providing the commodities or contractual services that are under bid a copy of the statement specified in subsection (1).

4) In the statement specified in subsection (1), this firm notifies the employees that, as a condition of working on the commodities or contractual services that are under bid, the employee will abide by the terms of the statement and will abide by the terms of the statement and will notify the employer of any conviction of, or plea of guilty or nolo contendere to, any violation of chapter 893 or of any controlled substance law of the United States or any state, for a violation occurring in the workplace no later than five (5) days after such conviction.

5) This firm imposes a sanction on or requires the satisfactory participation in a drug abuse assistance or rehabilitation program if such is available in the employee's community, by any employee who is so convicted.

6) This firm will continue to make a good faith effort to maintain a drug-free workplace through implementation of this section.

_____

Contractor's Name Signature

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NON-COLLUSIVE AFFIDAVIT

State of _____

County of _____ } SS.

_____ being first duly sworn, deposes and says that:

1. He/she is the _____, (Owner, Partner, Officer, Representative or Agent) of _____ the Offeror that has submitted the attached Proposal;
2. He/she is fully informed respecting the preparation and contents of the attached Proposal and of all pertinent circumstances respecting such Proposal;
3. Such Proposal is genuine and is not a collusive or sham Proposal;
4. Neither the said Offeror nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this affiant, have in any way colluded, conspired, connived or agreed, directly or indirectly, with any other Offeror, firm, or person to submit a collusive or sham Proposal in connection with the Work for which the attached Proposal has been submitted; or have in any manner, directly or indirectly sought by agreement or collusion, or have in any manner, directly or indirectly, sought by agreement or collusion, or communication or conference with any Offeror, firm, or person to fix the price or prices in the attached Proposal or of any other Offeror, or to fix any overhead, profit, or cost elements of the Proposal price or the Proposal price of any other Offeror, or to secure through any collusion, conspiracy, connivance, or unlawful agreement any advantage against (Recipient), or any person interested in the proposal Work.

Signed, sealed and delivered
in the presence of:

_____ By:_____

_____ _____
(Printed Name)

_____
(Title)

ACKNOWLEDGEMENT

State of _____

County of _____

On this _____ day of _____, 20___, before me, the undersigned Notary Public of the State of _____, personally appeared _____ and (Name(s) of Individual(s) who appeared before notary) whose name(s) in/are Subscribed to the written instrument, and he/she/they acknowledge that he/she/they executed it.

_____
NOTARY PUBLIC, STATE OF _____

NOTARY PUBLIC
SEAL OF OFFICE:

_____
(Name of Notary Public: Print, stamp, or type as commissioned)

☐Personally known to me, or ☐Produced Identification: _____ ☐ **DID** take an oath, or ☐**DID NOT** take an oath

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PUBLIC ENTITY CRIME INFORMATION

A person or affiliate who has been placed on the State of Florida's convicted vendor list following a conviction for a public entity crime may not submit a BID/ITB proposal on a contract to provide any goods or services to a public entity, may not submit a response on a contract with a public entity for services in the construction or repair of a public building or public work, may not submit bids on leases of real property to a public entity, may not be awarded or perform work as a Contractor, supplier, Sub-Contractor, or Contractor under a contract with any public entity, and may not transact business with any public entity in excess of the threshold amount provided in **Section 2876.017, for CATEGORY TWO for a period of 36 months from the date of being placed on the convicted vendor list**.

I, _____, being an authorized representative

of the firm of _____, located at City:

_____ State: _____ Zip: _____, have

read and understand the contents of the Public Entity Crime Information and of this

formal BID/ITB package, hereby submit our proposal accordingly.

Signature: _____ Date: _____

Phone: _____ Fax: _____

Federal ID#: _____

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NO BID RESPONSE

IMPORTANT: If you choose not to submit a bid for the attached "Invitation To Bid," please complete and return this form only on/before bid closing date. Failure to respond will result in your company being negatively registered as non-responsive. In the event five (5) "no responses" are posted, you will be automatically dropped from out mailing list for future solicitations for the described product/service.

Thank you for taking this opportunity to help us update and improve the solicitation process.

Bid Open/Close Date: **April 20, 2018 at 2:00 PM**

Bid Number: **3083-18**

Description: **EWRF Lift Station Force Main Relocation and Reaeration Blower Replacement Projects**

Contact: **Peter Boers, Procurement- Finance Department**

Please check the appropriate response. We respectfully submit "No bid" for the following reason(s):

☐ 1. We are unable to meet the required delivery date

☐ 2. We cannot provide a product to meet the required specifications.

☐ 3. We no longer provide the requested product.

☐ 4. We do not represent the required brand name product.

☐ 5. The bid closing date does not allow adequate time to prepare a response.

☐ 6. The specifications are too restrictive.

☐ 7. We have chosen not to do business with the City

☐ 8. Other (feel free to provide our response on your company letterhead.)

Company Name _____ Vendor No._____

Authorized Signature_____

Print Name _____

Title _____

Date _____ Telephone No. _____

+ + END OF BID FORM + +

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SAMPLE CONTRACT

THIS CONTRACT, pursuant to City Council approval granted on _____, is made and entered into this_____ day of _____, 20__, by and between the City of Venice, Florida, hereinafter referred to as the City, and _____, hereinafter referred to as the Contractor.

W I T N E S S E T H:

THAT FOR and in consideration of the mutual covenants and obligations hereafter set forth, the parties hereto agree as follows:

(1) The Contract Documents consist of this Contract, Performance and Payment Bonds attached hereto as composite Attachment A and, the City's Invitation to Bid (ITB) # **3083-18 EWRF Lift Station Force Main Relocation and Reaeration Blower Replacement Projects**, including: standard general conditions, supplemental conditions, special conditions, technical specifications, drawings, Contractor's bid proposal for ITB 3083-18, all of which are incorporated herein by reference. All of the Contract Documents are made a part of this Contract.

(2) The Contractor shall perform all the work required by the Contract Documents and shall include installation of the listed items per the bid specifications.

(3a) The work to be performed under this Contract for the EWRF Lift Station Force Main Relocation Project shall be completed within **one hundred-twenty (120)** days of the issuance of the Notice to Proceed by the City.

(3b) The work to be performed under this Contract for the EWRF Reaeration Blower Replacement Project shall be completed within **one hundred ninety-five (195)** days of the issuance of the Notice to Proceed by the City.

(4) The City shall pay the Contractor for the performance of the work, in accordance with Exhibit B, subject to the terms and conditions of the Contract Documents and any written change orders, the Contract sum not to exceed:_____ **& __/100s ($_____).**

(5) Time is of the essence in this Contract. In the event that the work is not completed within the required time as specified in Section 3 herein, then from the compensation otherwise to be paid to the Contractor, the City may retain the sum of **one thousand five hundred thirty-two dollars ($1,532) per day** for each calendar day that the work remains incomplete beyond the time limit, which sum shall represent the actual damage which the City will have sustained per day by failure of the Contractor to complete the work within the required time, said sum not being a penalty but being the stipulated damages the City will have sustained in the event of such default by the Contractor.

(6) In connection with the performance of work under this Contract, the Contractor agrees not to discriminate against any employee or applicant for employment because of race, sex, religion, color, or national origin. The aforesaid provision shall include, but not be limited to, the following:

employment, upgrading, demotion or transfer, recruitment or recruitment advertising, lay-off or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship. The Contractor agrees to post hereafter in conspicuous places, available for employees or applicants for employment, notices to be provided by the contracting officer setting forth the provisions of the non-discrimination clause. The Contractor further agrees to insert the foregoing provisions in all contracts hereunder, including contracts or agreements with labor unions and/or workers' representatives, except subcontracts for standard commercial supplies or raw materials.

(7) Contractor must secure and maintain any and all permits and licenses required to complete the work under this Contract, unless the Contract Documents provide otherwise.

(8) Throughout the term of this Contract the Contractor must maintain insurance in at least the amounts and coverage required as shown in Exhibit C. The Contractor must provide a Certificate of Insurance to the City evidencing such coverage prior to issuance of the Notice to Proceed by the City.

(9) Contractor agrees to comply with Florida's public records law by keeping and maintaining public records that ordinarily and necessarily would be required by the public agency in order to perform the services of this Contract; upon the request of the City's Custodian of Public Records, by providing the City with copies of or access to public records on the same terms and conditions that City would provide the records and at a cost that does not exceed the cost provided by Florida law; by ensuring that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed excepts as authorized by law for the duration of the term of the Contract and following completion of the Contract if the Contractor does not transfer the records to the City; and upon completion of the Contract by transferring, at no cost, to City all public records in possession of Contractor or by keeping and maintaining all public records required by the City to perform the services of this Contract. If the Contractor transfers all public records to the City upon completion of the Contract, the Contractor shall destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. If the Contractor keeps and maintains public records upon completion of the Contract, the Contractor shall meet all applicable requirements for retaining public records. All records stored electronically must be provided to the City, upon request from the City's custodian of public records, in a format that is compatible with the information technology systems of the City.

IF THE CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO THE CONTRACTOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS CONTRACT, CONTACT THE CITY'S CUSTODIAN OF PUBLIC RECORDS LORI STELZER, MMC, CITY CLERK, AT 401 W. VENICE AVENUE, VENICE, FLORIDA 34285, (941) 882-7390, LSTELZER@VENICEGOV.COM.

(10) Contractor shall indemnify, pay the cost of defense, including attorneys' fees, and hold harmless the City from all suits, actions, or claims of any kind brought on account of any injuries or damages received or sustained by any person or property by or from the Contractor or in consequence of any neglect in safeguarding the work; or by the use of any unacceptable materials related to the work; or on account of any act or omission, neglect or misconduct of the Contractor; or on account of any claim or amounts received under the "Workers' Compensation Law" or any

other laws or ordinances, except only such injury or damage as shall have been caused by the negligence of the City. The first ten dollars ($10.00) of compensation received by the Contractor represents specific consideration for this indemnification obligation.

(11) Contractor shall be responsible for compliance with the requirements under Chapter 556, Florida Statutes, the "Underground Facility Damage Prevention and Safety Act." Contractor's obligations to defend, indemnify, and hold harmless the City, as provided for under Section 10 of this Contract, shall specifically apply to any violations alleged against the City under the Underground Facility Damage Prevention and Safety Act related to the performance of the work under this Contract. Contractor acknowledges that included in the various items of the proposal and in the total bid price, are costs for complying with the Florida Trench Safety Act (90-96 Laws of Florida) effective October 1, 1990.

(12) Termination. This Contract may be terminated by the City without cause, by giving thirty (30) days prior written notice to Contractor of the intention to cancel. or with cause at any time Contractor fails to fulfill or abide by any of the terms or conditions specified. Failure of Contractor to comply with any of the provisions of this agreement shall be considered a material breach of Contract and shall be cause for immediate termination of the agreement at the discretion of the city. This Contract may be terminated by the Contractor only by mutual consent of both parties. If this Contract is terminated before performance is completed, the Contractor shall be paid only for that work satisfactorily performed for which costs can be substantiated.

(13) The laws of the State of Florida shall govern all provisions of this Contract. Venue for any dispute shall be Sarasota County, Florida. If any court proceeding or other action occurs between the parties as a result of this Contract or any other document or act required by this Contract, the prevailing party shall be entitled to recover attorney’s fees and all court costs, including attorney’s fees and court costs incurred in any pre-trial, trial, appellate, and/or bankruptcy proceedings, as well as, attorney’s fees and costs incurred in determining entitlement to and reasonableness of fees and costs.

(14) This Contract and the Contract Documents constitute the entire agreement of the parties and may not be changed or modified, except by a written document signed by both parties hereto. This Contract shall be binding upon the successors and assigns of the parties.

IN WITNESS WHEREOF, the parties to the agreement have hereunto set their hands and seals and have executed this agreement, the day and year first above written.

(SEAL)

ATTEST:	CITY OF VENICE IN SARASOTA COUNTY, FLORIDA
_____ CITY CLERK	BY:_____ MAYOR JOHN HOLIC
ATTEST:	_____
_____	BY:_____
_____ Signed by (typed or printed)	_____ Signed by (typed or printed)

Approved as to Form and Correctness

_____
David Persson, City Attorney

EXHIBIT A

SURETY BONDS

At the time of executing the Contract Documents, the successful proposer shall append to this sheet separate performance and payment bonds each equal to one-hundred percent (100%) of the Contract amount. Said bonds become an integral part of these Contract Documents and shall meet the following requirements:

1. Surety bonds submitted shall be written by a surety company that is approved by the City Finance Director and authorized to do business in the State of Florida, shall be accompanied by evidence of the authority of the issuing agent, and shall be on a form to be approved by the City Attorney. No bond in an amount greater than $5,000 required by the City Charter, the Ordinances of The City of Venice, or the laws of the State of Florida shall be approved by the City Finance Director unless the surety company executing the bond is listed by the United States Treasury Department as being approved for writing bonds for Federal projects and its current list in an amount not less than the amount of the bond tendered to The City of Venice.

2. Both the separate payment and performance bonds shall be in the general form of AIA documents A311. Additionally, the payment bond shall state as follows:
"This bond is issued in compliance with Section 255.05, Florida Statutes (1994 Supp.), as may be amended. A claimant, except a laborer, who is not in privity with the Contractor and who has not received payment for his labor, materials, or supplies shall, within 45 days after beginning to furnish labor, materials, or supplies for the prosecution of the work, furnish the Contractor with a notice, that he intends to look to the bond for protection. A claimant who is not in privity with the Contractor and who has not received payment for his labor, materials, or supplies shall, within 90 days after performance of the labor or after complete delivery of the materials or supplies, or with respect to rental equipment, within 90 days after the date that the rental equipment was last on the job site available for use, deliver to the Contractor and to the surety written notice of the performance of the labor or delivery of the materials or supplies and of the nonpayment. No action for the labor, materials, or supplies may be instituted against the Contractor or the surety unless both notices have been given. No action shall be instituted against the Contractor or the surety on the payment bond or the payment provisions of a combined payment and performance bond after 1 year from the performance of the labor or completion of delivery of the materials or supplies. A claimant may not waive in advance his right to bring an action under the bond against the surety. In any action brought to enforce a claim against a payment bond under this section, the prevailing party is entitled to recover a reasonable fee for the services of his attorney for trial and appeal or for arbitration, in an amount to be determined by the court, which fee must be taxed as part of his costs, as allowed in equitable actions."

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PUBLIC WORKS PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS:

THAT _____., as Principal, hereinafter called Contractor; and_____ _____, a corporation of the State of Florida, as surety, hereinafter called Surety, are held and firmly bound unto the City of Venice as Obligee, hereinafter called the City, in the amount of ($_____) _____ __ /100's, for the payment whereof Contractor and Surety bind themselves, their heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, Contractor has by written agreement dated the _____day of _____, 20__, entered into a Contract with the City for the following described project: **ITB# 3083-18 EWRF Lift Station Force Main Relocation and Reaeration Blower Replacement Projects** which Contract is by reference incorporated herein and made a part hereof, and is hereinafter referred to as the Contract.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if Contractor shall promptly make payments to all persons supplying Contractor labor, materials and supplies, used directly or indirectly by the said Contractor or Subcontractors in the prosecution of the work provided for in said Contract, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

PROVIDED FURTHER, that the said Surety for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder or the Specifications accompanying the same shall in anywise affect its obligation on this Bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the work or to the Specifications.

PROVIDED FURTHER, that this Bond is issued pursuant to Section 255.05, Florida Statutes, and reference is hereby made to the notice and time limitations in said statute for making claims against this Bond.

PROVIDED FURTHER, that any suit under this Bond must be instituted before the expiration of one (1) year from the performance of the labor or completion of delivery of the materials or supplies.

PROVIDED FURTHER, no right of action shall accrue on this Bond to or for the use of any person or corporation other than the City named herein and those persons or corporations provided for by Section 255.05, Florida Statutes, their heirs, executors, administrators, successors or assigns.

SIGNED AND SEALED this_____day of_____,A.D., 20__.

IN THE PRESENCE OF: CONTRACTOR

_____ BY:_____

INSURANCE COMPANY

BY:_____
Agent and Attorney-in-Fact

PUBLIC WORKS PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS:

THAT _____, as Principal, hereinafter called Contractor; and _____, a corporation of the State of Florida, as surety, hereinafter called Surety, are held and firmly bound unto the City of Venice as Obligee, hereinafter called the City, in the amount of ($ _____) & _____/100's, for the payment whereof Contractor and Surety bind themselves, their heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, Contractor has by written agreement dated the _____ day of _____, 20___, entered into a Contract with the City of Venice for the following described project: **ITB# 3083-18 EWRF Lift Station Force Main Relocation and Reaeration Blower Replacement Projects** which Contract is by reference incorporated herein and made a part hereof, and is hereinafter referred to as the Contract.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if the Contractor shall promptly and faithfully perform the Contract during the original term thereof and any extensions thereof which may be granted by the City with or without notice to the Surety and during any guarantee or warranty period, including the obligation to correct any latent defects not discovered until after acceptance of the project by the City, and if he shall satisfy all claims and demands incurred under said Contract and shall fully indemnify and save harmless the City, its agents, Engineer and employees from all losses, damages, expenses, costs and Attorney's Fees, including appellate proceedings which it may suffer by reason of failure to do so, and shall reimburse and repay the City all outlay and expense which the City may incur in making good any default, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

PROVIDED FURTHER, whenever Contractor shall be, and declared by the City to be in default under the Contract, the City having performed is obligations thereunder, the Surety may promptly remedy the default or shall promptly:

(1) Complete the Contract in accordance with its terms and conditions; or

(2) Obtain a bid or bids for submission to the City for completing the Contract in accordance with its terms and conditions and upon determination by the City and Surety of the lowest responsible bidder, arrange for a Contract between such bidder and City and make available as work progresses (even though there should be a default or a succession of defaults under the Contract or Contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion, less the balance of the Contract price; but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the amount set forth in the first paragraph hereof. The term "balance of the Contract price" as used in this paragraph, shall mean the total

amount payable by the City to Contractor under the Contract and any amendments thereto, less the amount properly paid by the City to the Contractor.

PROVIDED FURTHER, the Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder or the Contract Documents accompanying the same shall in any waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the work or to the Contract Documents.

PROVIDED FURTHER, any suit under this bond must be instituted before the expiration of two (2) years from the date on which final payment under the Contract falls due; except that, when the action involves a latent defect, suit must be instituted within four (4) years from the time the defect is discovered or should have been discovered with the exercise of due diligence.

PROVIDED FURTHER, no right of action shall accrue on this bond to or for the use of any person or corporation other than the City, its successors or assigns.

SIGNED AND SEALED this_____day of_____, AD., 20___.

IN THE PRESENCE OF: CONTRACTOR

_____ BY: _____

INSURANCE COMPANY

BY: _____
Agent and Attorney-in-Fact

EXHIBIT B

(Bid Form to be Supplied)

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EXHIBIT C

Before performing any work, the Contractor shall procure and maintain, during the life of the Contract, insurance listed below. The policies of insurance shall be primary and written on forms acceptable to the City and placed with insurance carriers approved and licensed by the Insurance Department in the State of Florida and meet a minimum financial AM Best and Company rating of no less than A:VII. No changes are to be made to these specifications without prior written specific approval by the City.

1. The City of Venice is to be specifically included as an ***ADDITIONAL INSURED*** for **Commercial General Liability** and **Business Auto Policy**.
2. The City of Venice shall be named as Certificate Holder. ***Please Note that the Certificate Holder should read as follows:***

   The City of Venice
   401 W. Venice Avenue
   Venice, FL 34285

   No City Division, Department, or individual name should appear on the certificate. ***NO OTHER FORMAT WILL BE ACCEPTABLE.***
3. The "Acord" certification of insurance form shall be used.
4. Required Coverage

   a) **Commercial General Liability:** including but not limited to bodily injury, property damage, contractual liability, products and completed operations, and personal injury with limits of not less than $ 1,000,000 per occurrence, $ 1,000,000 aggregate covering all work performed under this Contract. Include broad form property damage (provide insurance for damage to property under the care custody and control of the Contractor)

   b) **Business Auto Policy:** including bodily injury and property damage for all vehicles owned, leased, hired and non-owned vehicles with limits of not less than $1,000,000 combined single limit covering all work performed under this Contract.

   c) **Workers Compensation:** Contractor will provide Workers Compensation Insurance on behalf of all employees, including sub-contractors, who are to provide a service under this Contract, as required under Florida Law, Chapter 440, and Employers Liability with limits of not less than $100,000 per employee per accident; $500,000 disease aggregate; and $100,000 per employee per disease.

   d) **Installation Floater/Installation Builders' Risk–Property Coverage:** Policy to cover direct physical loss or damage to materials, supplies, machinery, and equipment being installed, constructed or rigged by the Contractor in conjunction with its installation or construction. All items involved in the project including drainage/water sewer pipes, etc. (as included in description of project) need to be insured for the total completed replacement value. Coverage should include perils of fire, theft, vandalism, windstorm/hail, collapse and transit, sewer backup, testing, equipment breakdown,

waterborne property. Coverage shall start when the items to be installed are transported to City premises and remain in place until the interest of the Contractors ceases or the City accepts possession whichever comes first Coverage should apply to owned property and non-owned property in the Contractor's care, custody and control. The installation coverage forms shall provide coverage for building materials and supplies at the construction site, in transit to the site and similar property intended for the construction project at other locations as necessary or because of lack of storage space at the construction site. Coverage should apply on a Primary basis and should include a Waiver of Subrogation. Contractor should be responsible for any deductibles.

5. Policy Form:

a) All policies required by this Contract, with the exception of Workers Compensation, or unless specific approval is given by the City, are to be written on an occurrence basis, shall name the City of Venice, its Elected Officials, Officers, Agents, Employees as additional insured as their interest may appear under this Contract. Insurer(s), with the exception of Workers Compensation, shall agree to waive all rights of subrogation against the City of Venice, its Elected Officials, Officers, Agents, and Employees.

b) Insurance requirements itemized in this Contract, and required of the Contractor, shall be provided on behalf of all subcontractors to cover their operations performed under this Contract. The Contractor shall be held responsible for any modifications, deviations, or omissions in these insurance requirements as they apply to subcontractors.

c) Each insurance policy required by this Contract shall:

(1) apply separately to each insured against whom claim is made and suit is brought, except with respect to limits of the insurer's liability;

(2) be endorsed to state that coverage shall not be suspended, voided or canceled by either party except after thirty (30) calendar days prior written notice by certified mail, return receipt requested, has been given to the City of Venice's Director of Administrative Services.

d) The City shall retain the right to review, at any time, coverage form, and amount of insurance.

e) The procuring of required policies of insurance shall not be construed to limit Contractor's liability nor to fulfill the indemnification provisions and requirements of this Contract.

f) The Contractor shall be solely responsible for payment of all premiums for insurance contributing to the satisfaction of this Contract and shall be solely responsible for the payment of any deductible and/or retention to which such policies are subject, whether or not the City is an insured under the policy. In the event that claims in excess of the insured amounts provided herein are filed by reason of operations under the Contract, the amount excess of such claims, or any portion thereof, may be withheld from any payment due or to become due to the Contractor until such time the Contractor shall furnish additional security covering such claims as may be determined by the City.

g) Claims Made Policies will be accepted for professional and hazardous materials and

such other risks as are authorized by the City. All Claims Made Policies contributing to the satisfaction of the insurance requirements herein shall have an extended reporting period option or automatic coverage of not less than two years. If provided as an option, the Contractor agrees to purchase the extended reporting period on cancellation or termination unless a new policy is affected with a retroactive date, including at least the last policy year.

h) Certificates of Insurance evidencing Claims Made or Occurrence form coverage and conditions to this Contract, as well as the City's Bid Number and description of work, are to be furnished to the City's Director of Administrative Services, 401 West Venice Avenue, Venice, FL 34285, ten (10) business days prior to commencement of work and a minimum of thirty (30) calendar days prior to expiration of the insurance policy.

i) Notices of Accidents and Notices of Claims associated with work being performed under this Contract, shall be provided to the Contractor's insurance company and the City's Director of Administrative Services, as soon as practicable after notice to the insured.

j) All property losses shall be payable to, and adjusted with, the City.

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CONTRACTOR'S RELEASE OF LIEN

BEFORE ME, the undersigned authority in said County and State, appeared _____, who being first duly sworn, deposes and says that he is _____ of _____ a company and/or corporation authorized to do business under the laws of Florida, which is the Contractor on Project known as City of Venice Bid # 3083-18, located in the City of Venice, County of Sarasota, Florida, under Contract with the City of Venice, dated the _____ day of_____, 20__, that the said deponent is duly authorized to make this affidavit by resolution of the Board of Directors of said company and/or corporation; that deponent knows of his own knowledge that said Contract has been complied with in every particular by said Contractor and that all parts of the work have been approved by the City Engineer; that there are no bills remaining unpaid for labor, material or otherwise, in connection with said Contract and work, and that there are no suits pending against the undersigned as Contractor or anyone in connection with the work done and materials furnished or otherwise, under said Contract.

DEPONENT further says that the final estimate which has been submitted to the City simultaneously with the making of this affidavit, constitutes all claims and demands against the City on account of said Contract or otherwise, and that acceptance of the sum specified in said final estimate will operate as a full and final release and discharge of the City from any further claims, demands or compensation by Contractor under the above Contract.

DEPONENT further agrees that all guarantees under this Contract shall start and be in full force from the date of this release as spelled out in the Contract documents.

Signature:_____

Printed Name:

STATE OF FLORIDA)
COUNTY OF)

Signed before me this _____ day of _____, 20__,
by_____ who is personally known to me or has produced
_____ as identification.
_____

Notary Public
My Commission Expires:
Commission Number:

WE, the _____, having heretofore executed a performance bond and a payment bond for the above named Contractor covering project and section as described above in the sum of ($_____)_____
Dollars, hereby agree that the Owner may make full payment of the final estimate, including the retained percentage, to said Contractor.

IT IS fully understood that the granting of the right to make the payment of the final estimate to said Contractor and/or his assigns, shall in no way relieve this surety company of its

obligations under its bonds, as set forth in the specifications, Contract, and bonds pertaining to the above project.

IN WITNESS WHEREOF, the _____has caused this instrument to be executed on its behalf by its_____, and/or its duly authorized attorney in fact, and its corporate seal to be hereunto affixed, all on this _____ day of _____, A.D., 20__.

_____
Surety Company

_____
Attorney in Fact

Power of Attorney must be attached if executed by Attorney in Fact.

STATE OF)
COUNTY OF)
BEFORE ME, the undersigned authority, appeared_____, who is personally known to me or has produced _____ as identification, and who executed the foregoing instrument in the name of _____ _____ as its _____ and the said _____ acknowledged that he executed said instrument in the name of _____ as its _____ and/or_____, for the purpose therein expressed and that he had due and legal authority to execute the same on behalf of said _____, a corporation.
IN WITNESS WHEREOF, I have hereunto set my hand and official seal at _____ this _____ day of _____, 20__.

_____
Notary Public
My Commission Expires:

CERTIFICATE OF SUBSTANTIAL COMPLETION

PROJECT NO.
PROJECT:
CONTRACTOR CONTRACT DATE

CONTRACT FOR

Project or Specified Part Shall Include:
DEFINITION OF SUBSTANTIAL COMPLETION
The date of substantial completion of a project or specified part of a project is the date when the work is sufficiently completed, in accordance with the Contract Documents, so that the project or specified part of the project can be utilized for the purpose for which it was intended.

TO: (Contractor)
DATE OF SUBSTANTIAL COMPLETION: _____

The work performed under this Contract has been inspected by authorized representatives of the City of Venice and the Contractor, and the project or specified part of the project, is hereby declared to be substantially completed on the above date.

A tentative list of items to be completed or corrected is appended hereto. This list may not be exhaustive, and the failure to include an item on it does not alter the responsibility of the Contractor to complete all the work in accordance with the Contract documents. These items shall be completed by the Contractor within _____ days of Substantial Completion.

The date of Substantial Completion is the date upon which all guarantees and warranties begin, except as noted below. The responsibilities between the Owner and the Contractor for maintenance shall be as set forth below.

CITY OF VENICE
_____
By:
Date: _____

The Contractor accepts the foregoing Certification of Substantial Completion and agrees to complete and correct the items on the tentative list within the time indicated.
_____ _____
Contractor Authorized Representative
Date: _____

RESPONSIBILITIES:
OWNER:
CONTRACTOR:
EXCEPTIONS AS TO GUARANTEES AND WARRANTIES:
ATTACHMENTS (Identify)

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BIDDER QUALIFICATION STATEMENT

(Completion of this statement is required in advance of consideration for award of Contract.)

SUBMITTED TO:

City of Venice
401 West Venice Avenue
Venice, FL 34285

SUBMITTED FOR:

EWRF Lift Station Force Main Relocation and Reaeration Blower Replacement Projects

SUBMITTED BY:

Name of Organization: _____
(Print or Type Name of Bidder)

Name of Individual: _____

Title: _____

Business Address: _____

_____

Telephone No.: _____

Fax No.: _____

E-mail Address: _____

Bidder's Website: _____

If address and phone number given above is for a branch office, provide address and phone number of principal home office:

Principal Home Office Address: _____

_____

Principal Home Office Telephone No.: _____

Gentlemen:

The undersigned certifies under oath the truth and correctness of all statements and of all answers to questions made hereinafter.

(Note: Attach additional sheets as required.)

1.0 Bidder's General Business Information

1.1 Check if:

☐ Corporation ☐ Partnership ☐ Joint Venture ☐ Other

☐ Limited Liability Company ☐ Sole Proprietorship

If Corporation:

A. Date and State of Incorporation:

_____

_____

B. List of Executive Officers:

Name	Title	Address

If Partnership:

A. Date and State of Organization:

_____

_____

B. Current General Partners (name and address for each):

_____

_____

C. Type of Partnership

☐ General ☐ Publicly Traded ☐ Limited

☐ Limited Liability ☐ Other (describe): _____

If Joint Venture:

A. Date and State of Organization:

_____
_____

B. Name, Address, Form of Organization, and State of Organization of Each Joint Venture Partner: (Indicate with an asterisk (*) the managing or controlling Joint Venturer if applicable):

_____
_____
_____
_____
_____

If Limited Liability Company:

A. Date and State of Organization:

_____
_____

B. Members:

Name	Address

If Sole Proprietorship:

A. Date and State of Organization:

_____
_____

B. Name and Address of Owner or Owners:

_____
_____
_____
_____

If Other Type of Organization:

A. Type of Organization: _____

B. Date and State of Organization:

_____
_____

C. Name and Address of Each Owner or Principal:

_____
_____
_____
_____

1.2 Certifications: In addition to the above categories of business entities, indicate whether Bidder's organization is a:

- ☐ Disadvantaged Business Enterprise, certified by _____
- ☐ Minority Business Enterprise, certified by _____
- ☐ Women's Business Enterprise, certified by _____
- ☐ Historically Underutilized Business Zone Small Business Concern, certified by _____

2.0 How many years has your organization been in business as a general contractor? _____

3.0 If your organizational structure has changed within the past five years, provide data as listed above in Item 1.0 for your previous organization.

4.0 Do you plan to subcontract any part of this project? _____ If so, give details.

5.0 Has any construction contract to which you have been a party been terminated by the owner; have you ever terminated work on a project prior to its completion for any reason; has any surety which issued a performance bond on your behalf ever completed the work in its own name or financed such completion on your behalf; has any surety expended any monies in connection with a contract for which they furnished a bond on your behalf? If the answer to any portion of this question is "yes", furnish details of all such occurrences including name of owner, architect or engineer, and surety, and name and date of project.

6.0 Has any officer or partner of your organization ever been an officer or partner of another organization that had any construction contract terminated by the owner; terminated work on a project prior to its completion for any reason; had any surety which issued a performance bond complete the work in its own name or financed such completion; or had any surety expend any monies in connection with a contract for which they furnished a bond? If the answer to any portion of this question is "yes", furnish details of all such occurrences including name of owner, architect or engineer, and surety, and name and date of project.

7.0 In the last five years, has your organization, or any predecessor organization, failed to substantially complete a project in a timely manner? If the answer to this question is “yes”, furnish details of all such occurrences including name of owner, architect or engineer, and surety, and name and date of project.

8.0 On Schedule A, attached, list name, location and description of project, owner, architect or engineer, contract price, percent complete and scheduled completion of the major construction projects your organization has in progress on this date. Provide name, address and telephone number of a reference for each project listed.

9.0 On Schedule B, attached, list name, location and description of project, owner, architect or engineer, contract price, date of completion and percent of work with your own forces of major projects of the same general nature as this project which your organization has completed in the past five years. Provide name, address and telephone number of a reference for each project listed.

10.0 On Schedule C, attached, list name and construction experience of the principal individuals of your organization directly involved in construction operations.

11.0 Licenses and Registrations:

11.1 Indicate the jurisdictions in which your firm is legally qualified to practice. Indicate license or registration number for each jurisdiction, if applicable, and type of license or registration. Attach separate sheet as required.

Jurisdiction	License/Registration No.	Type

11.2 In the past five years, has Bidder had any business or professional license suspended or revoked?

☐ No ☐ Yes

If yes, describe on a separate attachment the circumstances, including the jurisdiction and bases for suspension or revocation.

12.0 Provide the following information for your surety:

12.1 Surety Company: _____

12.2 Agent: _____

A. Address: _____

B. Telephone No.: _____

13.0 Provide the following with respect to an accredited banking institution familiar with your organization.

13.1 Name of Bank: _____

13.2 Address: _____

13.3 Account Manager: _____

13.4 Telephone No.: _____

14.0 Provide the name, address and telephone number of an individual who represents a major equipment/material supplier whom the Owner may contact for a financial reference:

15.0 Industry Affiliations, Memberships, Awards, and Honors

15.1 List below the industry organizations with which your organization is affiliated or which your organization is a member:

15.2 List below the industry awards or honors received by your organization and the date for each. Attach supporting documentation as necessary.

16.0 Statement of Potential Conflicts of Interest: List below business associations, financial interests, or other circumstances that may create a conflict of interest with the Owner or other entity involved in the Project. Attach additional documentation as required.

17.0 Dated at _____, this _____ day of _____, 20__.

Bidder: _____
(Print or Type Name of Bidder)

By:_____

_____

Title:_____

Attachments A, B and C

(Seal, if corporation)

----------(Affidavit for Individual)----------

_____ being duly sworn, deposes and says that:
a) the financial statement, taken from his/her books, is a true and accurate statement of his/her financial condition as of the date thereof; and b) all of the foregoing qualification information is true, complete, and accurate.

----------(Affidavit for Partnership)----------

_____ being duly sworn, deposes and says that:
a) he/she is a member of the partnership of _____;
b) he/she is familiar with the books of said partnership showing its financial condition; c) the financial statement, taken from the books of said partnership, is a true and accurate statement of the financial condition of the partnership as of the date thereof; and d) all of the foregoing qualification information is true, complete, and accurate.

----------(Affidavit for Corporation)----------

_____ being duly sworn, deposes and says that: a) he/she is _____ of _____;
(Full name of Corporation)
b) he/she is familiar with the books of said corporation showing its financial condition; c) the financial statement, taken from the books of said corporation, is a true and accurate statement of the financial condition of said corporation as of the date thereof; and d) that all of the foregoing qualification information is true, complete, and accurate.

----------(Affidavit for Limited Liability Company (LLC))----------

_____ being duly sworn, deposes and says that: a) he/she is _____ of _____;
(Full name of LLC)
b) he/she is familiar with the books of said company showing its financial condition; c) the financial statement, taken from the books of said company, is a true and accurate statement of the financial condition of said company as of the date thereof; and d) that all of the foregoing qualification information is true, complete, and accurate.

----------(Affidavit for Joint Venture)----------

Each joint venturer shall complete the affidavit appropriate for the joint venturer's type of organization and attach said affidavit to the Bidder Qualifications Statement. Submit separate acknowledgement for each joint venturer's affidavit.

---------- (Acknowledgment) ----------

_____ being duly sworn, deposes and says
that he/she is _____ of _____;
(Name of Bidder)
that he/she is duly authorized to make the foregoing affidavit and that he/she makes it on behalf of
( ) himself/herself; ( ) said partnership; ( ) said corporation;
( ) said joint venture; ( ) said limited liability company
Sworn to before me this _____ day of _____, 20___, in the County of _____, State of _____.

_____
__
(Notary Public)

My commission expires _____

(Seal)

+ + END OF BIDDER QUALIFICATIONS STATEMENT + +

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ATTACHMENT A

SCHEDULE A
PROJECTS IN PROGRESS

Name, Location and Description of Project	Owner	Architect or Engineer	Contract Price	Percent Complete	Scheduled Completion	Reference/Contract Include Address and Phone

ATTACHMENT B

SCHEDULE B
PROJECTS COMPLETED

Name, Location and Description of Project	Owner	Architect or Engineer	Date Completed	Contract Price	Percent with Own Forces	Reference/Contract Include Address and Phone

ATTACHMENT C

SCHEDULE C
PERSONNEL

Name	Position	Date Started With This Organization	Date Started In Construction	Prior Positions and Experience In Construction

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GENERAL CONDITIONS
OF THE CONSTRUCTION CONTRACT

Adapted from EJCDC C-700, Standard General Conditions
of the Construction Contract (2007 Edition)

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GENERAL CONDITIONS

ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified 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 which is evidence of the agreement between Owner and Contractor covering the Work.

3. *Application for Payment* – The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

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

5. *Bid* – The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

6. *Bidder* – The individual or entity who submits a Bid directly to Owner.

7. *Bidding Documents* – The Bidding Requirements and the proposed Contract Documents (including all Addenda).

8. *Bidding Requirements* – The Advertisement or Invitation to Bid, Instructions to Bidders, bid security of acceptable form, if any, and the Bid Form with any supplements.

9. *Change Order* – A document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.

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

11. *Contract* – The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents* – Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor's submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.

13. *Contract Price* – The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).

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

15. *Contractor* or *CONTRACTOR* – The individual or entity with whom Owner has entered into the Agreement.

16. *Cost of the Work* – See Paragraph 11.01.A for definition.

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

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

19. *Engineer* or *ENGINEER* – The individual or entity named as such in the Agreement.

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

21. *General Requirements* – Sections of Division 01 of the Specifications.

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

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

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

25. *Liens* – Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

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

27. *Notice of Award* – The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.

28. *Notice to Proceed* – A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.

29. *Owner* or *OWNER* – The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.

30. *PCBs* – Polychlorinated biphenyls.

31. *Petroleum* – Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.

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

33. *Project* – The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.

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

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

36. *Resident Project Representative* – The authorized representative of Engineer who may be assigned to the Site or any part thereof.

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

38. *Schedule of Submittals* – A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.

39. *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.

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

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

42. *Specifications* – That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.

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

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

45. *Successful Bidder* – The Bidder submitting a responsive Bid to whom Owner makes an award.

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

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

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

49. *Unit Price Work* – Work to be paid for on the basis of unit prices.

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

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

1.02 T*erminology*

A. The words and terms referenced in this Paragraph 1.02 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 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 Paragraph 9.09 or any other provision of the Contract Documents.

C. *Day*

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

D. *Defective*

1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:

   a. does not conform to the Contract Documents, or

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

   c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

E. *Furnish, Install, Perform, Provide*

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

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

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

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

F. Unless stated otherwise in the Contract Documents, words or phrases 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. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.

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

2.02 *Copies of Documents*

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

2.03 *Commencement of Contract Times; Notice to Proceed*

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

2.04 *Starting the Work*

A. Contractor shall start to perform the Work on the date when the Contract Times

commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

2.05 *Before Starting Construction*

A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:

1. a preliminary Progress Schedule;

2. a preliminary Schedule of Submittals; and

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

2.06 *Preconstruction Conference; Designation of Authorized Representative*

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

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 instructions, receive information, render decisions relative to the Contract and otherwise act on behalf of each respective party.

2.07 *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 2.05.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 component parts of the Work.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

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

B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for at no additional cost to Owner.

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

3.02 *Reference Standards*

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

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

2. No provision of any such standard, specification, manual or code, or any instruction of a Supplier shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, 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 Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. Reporting Discrepancies

1. *Contractor's Review of Contract Documents Before Starting Work*: Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor discovers or has actual knowledge of and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.

2. *Contractor's Review of Contract Documents During Performance of Work*: If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and

   a) any applicable Law or Regulation,

   b) any standard, specification, manual or code, or,

   c) 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 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.

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

B. *Resolving Discrepancies*

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

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

   b. the provisions of any Laws or Regulations applicable to the performance of the

Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Amending and Supplementing Contract Documents*

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.

B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:

1. a Field Order;

2. Engineer's approval of a Shop Drawing or Sample; (subject to the provisions of Paragraph 6.17.D.3); or

3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

A. Contractor and any Subcontractor or Supplier shall not:

1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or Engineer's consultants, including electronic media editions; or

2. reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.

B. The 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.

3.06 *Electronic Data*

A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor or by Contractor to Owner or Engineer that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.

B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.

C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

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

4.01 *Availability of Lands*

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

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

4.02 *Subsurface and Physical Conditions*

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

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

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

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely on the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical

data," Contractor may not rely upon or make any claim against Owner 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.

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed either:

1. is of such a nature as to establish that any "technical data" on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or

2. is of such a nature as to require a change in the Contract Documents; or

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

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

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

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

C. *Possible Price and Times Adjustments*

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the

extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

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

b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.

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

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

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

c. Contractor failed to give the written notice as required by Paragraph 4.03.A.

3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants or subcontractors shall be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

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

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data 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 such information and data,

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

   c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction, and

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

B. *Not Shown or Indicated*

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

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

4.05 *Reference Points*

A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the

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

4.06 *Hazardous Environmental Condition at Site*

A. *Reports and Drawings:* The Supplementary Conditions identify those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at the Site.,

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner 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 any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.

D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall

promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. 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 4.06.E.

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

F. 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. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.

G. To the fullest extent permitted by Laws and Regulations, 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 a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's sole negligence.

H. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 – BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all

of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.

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

C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

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

5.03 *Certificates of Insurance*

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

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

C. Failure of Owner to demand such certificates or other evidence of Contractor's full

compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.

D. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.

E. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

5.04 *Contractor's Liability Insurance*

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

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

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

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

4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:

   a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or

   b. by any other person for any other reason;

5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and

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

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

1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, be written on an occurrence basis, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, 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;

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

3. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;

4. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);

5. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and

6. include completed operations insurance;

    a. such insurance shall remain in effect for at least two years after final payment, and

    b. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

5.05 *Owner's Liability Insurance*

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

5.06 (Not Used)

5.07 (Not Used)

5.08 (Not Used)

5.09 (Not Used)

5.10 *Acceptance of Bonds and Insurance; Option to Replace*

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

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.

B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances. Unless the Owner shall otherwise agree in writing, the superintendent will be Contractor's representative at the Site and shall have authority to act on behalf of Contractor. All communications given to or

received from the superintendent shall be binding on Contractor.

6.02 *Labor; Working Hours*

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

B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *Services, Materials, and Equipment*

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

B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

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

6.04 *Progress Schedule*

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

1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.

2. Proposed adjustments in the Progress Schedule that will change the Contract

Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 *Substitutes and "Or-Equals"*

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

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

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

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

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; and

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

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

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

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

2. *Substitute Items*

a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.

b. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.

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

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

1) shall certify that the proposed substitute item will:

a) perform adequately the functions and achieve the results called for by the general design,

b) be similar in substance to that specified, and

c) be suited to the same use as that specified;

2) will state:

a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time,

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

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

3) will identify:

a) all variations of the proposed substitute item from that specified, and

b) available engineering, sales, maintenance, repair, and replacement services; and

4) shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.

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

C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by a Change Order in the case of a substitute and an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.

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

E. *Engineer's Cost Reimbursement*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute 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.

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

6.06 *Concerning Subcontractors, Suppliers, and Others*

A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other

individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.

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

C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:

1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity; nor

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

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

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

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

G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to

an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as a loss payee on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (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 such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

6.07 *Patent Fees and Royalties*

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

B. 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.

6.08 *Permits*

A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 *Laws and Regulations*

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

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

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

6.10 *Taxes*

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

6.11 *Use of Site and Other Areas*

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

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

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

resolution proceeding or at law.

3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, 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 claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

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

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

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

6.12 *Record Documents*

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

6.13 *Safety and Protection*

A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons and 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, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.

C. Contractor shall comply with the applicable requirements of 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 programs 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 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or 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 for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

A. Contractor shall designate a qualified and experienced safety representative at the Site

whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

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

6.16 *Emergencies*

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

6.17 *Shop Drawings and Samples*

A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.

1. *Shop Drawings*

a. Submit number of copies specified in the General Requirements.

b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.

2. *Samples*

a. Submit number of Samples specified in the Specifications.

b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.

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

C. *Submittal Procedures*

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

   a. reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.;
   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 offered with respect to indicated use, 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 and approval of that submittal.

3. With each submittal, Contractor shall give Engineer specific written notice of any variations, that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawing or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. *Engineer's Review*

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

2. Engineer's review and approval will not extend to means, methods, techniques,

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

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

E. *Resubmittal Procedures*

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

6.18 *Continuing the Work*

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

6.19 *Contractor's General Warranty and Guarantee*

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective for a minimum period of one (1) year. Engineer and its officers, directors, members, partners, employees, agents, consultants and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.

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

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

2. normal wear and tear under normal usage.

C. Contractor's obligation to perform and complete the Work in accordance with the

Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:

1. observations by Engineer;

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

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

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

5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;

6. any inspection, test, or approval by others; or

7. any correction of defective Work by Owner.

6.20 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, 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:

1. is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of real or personal property (other than the Work itself), including the loss of use resulting therefrom; and

2. is caused by any act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable, regardless of whether or not caused in part by an individual or entity indemnified hereunder or whether liability is imposed upon such indemnified party by Laws or Regulations.

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

C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not be limited in any way by the amount or types of insurance provided by Contractor under Article 5 of the General Conditions.

D. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the sole negligence or willful misconduct of Owner or Engineer or of the officers, directors, members, partners, employees, agents, and consultants and subcontractors of each and any of them.

6.21 *Delegation of Professional Design Services*

A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.

B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.

D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.

E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 *Related Work at Site*

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

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

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

B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and shall properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, Contractor may cut or alter the work of others with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.

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

7.02 *Legal Relationships*

A. Paragraph 7.01.A is not applicable for utilities not under the control of Owner.

B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's actions or inactions.

C. Contractor shall be liable to Owner and any other contractor under direct contract to Owner for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's action or inactions.

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

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

8.02 *Furnish Data*

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

8.03 *Pay When Due*

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

8.04 *Lands and Easements; Reports and Tests*

A. Owner's duties with respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions relating to existing surface or subsurface structures at or contiguous to the Site.

8.05 *Insurance*

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

8.06 *Change Orders*

A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.07 *Inspections, Tests, and Approvals*

A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.08 *Limitations on Owner's Responsibilities*

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

8.09 *Undisclosed Hazardous Environmental Condition*

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

8.10 *Evidence of Financial Arrangements*

A. If and to the extent Owner has agreed to furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents, Owner's responsibility in respect thereof will be as set forth in the Supplementary Conditions.

8.11 *Compliance With Safety Programs*

A. While on 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 pursuant to Paragraph 6.13.B.

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *Owner's Representative*

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

9.02 *Visits to Site*

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

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, or have control over Contractor's Work, nor shall Engineer have authority over or responsibility for the means, methods, techniques, sequences, or procedures of construction selected by Contractor, for safety precautions and programs incident to Contractor's Work in progress, nor for any failure of Contractor to comply with Laws and Regulations applicable to Contractor's furnishing and performing the Work.

9.03 *Project Representative*

A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Authorized Variations in Work*

A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both,

and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

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

9.06 *Shop Drawings, Change Orders and Payments*

A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.

B. In connection with Engineer's authority, and limitations thereof, if any,

1. as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21;

2. as to Change Orders, see Articles 10, 11, and 12; and

3. as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

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

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

A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.

B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believes that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.

C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.

D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

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

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

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

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

E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.

9.10 *Compliance with Safety Programs*

A. While on the Site, Engineer's employees and representatives shall comply with the specific applicable requirements of the Contractor's safety programs of which Engineer has been informed pursuant to Paragraph 6.13.C.

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

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

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

10.02 *Unauthorized Changes in the Work*

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

10.03 *Execution of Change Orders*

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

1. changes in the Work which are:

a) ordered by Owner pursuant to Paragraph 10.01.A,

b) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or

c) agreed to by the parties;

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

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

10.04 *Notification to Surety*

A. If 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.

10.05 *Claims*

A. *Engineer's Decision Required*: All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.

B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).

C. *Engineer's Action*: Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any,

take one of the following actions in writing:

1. deny the Claim in whole or in part,

2. approve the Claim, or

3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.

D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.

E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.

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

ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 *Cost of the Work*

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

holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

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

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

4. Costs of special consultants (including but not limited to Engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.

5. Supplemental costs including the following:

   a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.

   b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

   c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

   d. Sales, consumer, use, and other similar taxes related to the Work, and for which

Contractor is liable, imposed by Laws and Regulations.

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

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

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

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

i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

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

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

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

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

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

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

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

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

11.02 *Allowances*

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

B. *Cash Allowances*

1. Contractor agrees that:

a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. *Contingency Allowance*

1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

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

11.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.

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

D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:

1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and

2. there is no corresponding adjustment with respect to any other item of Work; and

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

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

12.01 *Change of Contract Price*

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

B. The value of any Work covered by a Change Order or of any Claim for an adjustment

in the Contract Price will be determined as follows:

1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or

2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).

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

1. a mutually acceptable fixed fee; or

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

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

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

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

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

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

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

12.02 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

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

12.03 *Delays*

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

B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

C. If Owner, Engineer, or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

D. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of other contractors or utility owners, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.D.

E. Owner and Engineer and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each of them shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

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

13.01 *Notice of Defects*

A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. Defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 *Access to Work*

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

13.03 *Tests and Inspections*

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

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

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

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

3. as otherwise specifically provided in the Contract Documents.

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other

representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

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

E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall if requested by Engineer, uncover such Work for observation.

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

13.04 *Uncovering Work*

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

B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.

C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.

D. If, the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or

extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

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

13.06 *Correction or Removal of Defective Work*

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

B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. repair such defective land or areas; or

2. correct such defective Work; or

3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and

4. satisfactorily correct or repair or remove and replace any damage to other Work,

to the work of others or other land or areas resulting therefrom.

B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.

C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.

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

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

13.08 *Acceptance of Defective Work*

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

13.09 *Owner May Correct Defective Work*

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

B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.

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

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

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

14.02 *Progress Payments*

A. Applications for Payments

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

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

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

B. *Review of Applications*

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

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

a. the Work has progressed to the point indicated;

b. the quality of the Work is generally in accordance with the Contract Documents

(subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and to any other qualifications stated in the recommendation); and

c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

   a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or

   b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

   a. to supervise, direct, or control the Work, or

   b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or

   c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or

   d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or

   e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in

Engineer's opinion to protect Owner from loss because:

a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;

b. the Contract Price has been reduced by Change Orders;

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

d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. *Payment Becomes Due*

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

D. *Reduction in Payment*

1. Owner may refuse to make payment of the full amount recommended by Engineer because:

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

b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;

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

d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.

2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor remedies the reasons for such action.

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 14.02.C.1 and subject to interest as provided in the Agreement.

14.03 *Contractor's Warranty of Title*

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

14.04 *Substantial Completion*

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.

B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.

C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will within 14 days after submission of the tentative certificate to Owner notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will within said 14 days execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.

D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.

E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the tentative list.

14.05 *Partial Utilization*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions.

1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner and Engineer will follow the procedures of Paragraph 14.04.A through D for that part of the Work.

2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

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

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

14.06 *Final Inspection*

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

14.07 *Final Payment*

A. *Application for Payment*

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

2. The final Application for Payment shall be accompanied (except as previously delivered) by:

   a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.6;

   b. consent of the surety, if any, to final payment;

   c. a list of all Claims against Owner that Contractor believes are unsettled; and

   d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that:

   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.

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

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations

under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Payment Becomes Due*

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

14.08 *Final Completion Delayed*

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

14.09 *Waiver of Claims*

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

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

2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

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

15.02 *Owner May Terminate for Cause*

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

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

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

3. Contractor's disregard of the authority of Engineer; or

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

B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:

1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);

2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere; and

3. complete the Work as Owner may deem expedient.

C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled

to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph Owner shall not be required to obtain the lowest price for the Work performed.

D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.

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

F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B, and 15.02.C.

15.03 *Owner May Terminate For Convenience*

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

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

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

3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

4. reasonable expenses directly attributable to termination.

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

15.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 – DISPUTE RESOLUTION

16.01 *Methods and Procedures*

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

ARTICLE 17 – MISCELLANEOUS

17.01 *Giving Notice*

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or

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

17.02 *Computation of Times*

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

17.03 *Cumulative Remedies*

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

17.04 *Survival of Obligations*

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

17.05 *Controlling Law*

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

17.06 *Headings*

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

+ + END OF GENERAL CONDITIONS ++

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SUPPLEMENTARY CONDITIONS

SCOPE

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

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

The address system used in these Supplementary Conditions conforms to the address system used in the General Conditions, with the prefix "SC" added thereto.

SC-1.01.A.36 Change the definition of *Resident Project Representative* to read as follows:

SC-1.01.A.36 *Resident Project Representative:* The Owner's representative who will provide day to day inspection services of construction activities.

SC-1.01.A.51 Change the last sentence in the definition of *Work Change Directive* to read as follows:

"A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued IFCA or Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times."

SC-1.01.A.52 Add the following definition:

1.01.A.52 *Interim Field Change Agreement (IFCA)* - A document signed by the Engineer, Contractor, Owner and Owner's Representative documenting a change to the Work, which does not result in the total contract price exceeding the amount specified in the contract. An IFCA will authorize re-distribution of existing contract amounts or use of Owner's Allowance funds.

SC-4.03, A. Change the last paragraph to read as follows:

"then Contractor shall, within seven (7) days after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in

connection therewith (except as aforesaid) until receipt of written order to do so.

SC-4.06 Delete Paragraphs 4.06.A and 4.06.B in their entirety and insert the following:

SC-4.06.A. In the preparation of the Drawings and Specifications, Engineer has not utilized any report or drawing related to a Hazardous Environmental Condition identified at the Site.

SC-4.06.B (Not Used)

SC- Article 5 Replace the entire article with the following:

Before performing any work, the Contractor shall procure and maintain, during the life of the Contract, insurance listed below. The policies of insurance shall be primary and written on forms acceptable to the Owner and placed with insurance carriers approved and licensed by the Insurance Department in the State of Florida and meet a minimum financial AM Best and Company rating of no less than A:VII. No changes are to be made to these specifications without prior written specific approval by the City.

1. The City of Venice is to be specifically included as an ***ADDITIONAL INSURED***.
2. The City of Venice shall be named as Certificate Holder. ***Please Note that the Certificate Holder should read as follows:***

   The City of Venice 401
   W. Venice Avenue
   Venice, FL 34285

   No City Division, Department, or individual name should appear on the certificate. ***NO OTHER FORMAT WILL BE ACCEPTABLE.***
3. The "Acord" certification of insurance form shall be used.
4. Required Coverage

   a) **Commercial General Liability:** including but not limited to bodily injury, property damage, contractual liability, products and completed operations, and personal injury with limits of not less than $ 1,000,000 per occurrence, $ 1,000,000 aggregate covering all work performed under this Contract. Include broad form property damage (provide insurance for damage to property under the care custody and control of the contractor)

   b) **Business Auto Policy:** including bodily injury and property damage for all vehicles owned, leased, hired and non-owned vehicles with limits of not less than $1,000,000 combined single limit covering all work performed under this Contract.

c) **Workers Compensation:** Contractor will provide Workers Compensation Insurance on behalf of all employees, including sub-contractors, who are to provide a service under this Contract, as required under Florida Law, Chapter 440, and Employers Liability with limits of not less than $100,000 per employee per accident; $500,000 disease aggregate; and $100,000 per employee per disease.

d) **Installation Floater/Installation Builders' Risk–Property Coverage:** Policy to cover direct physical loss or damage to materials, supplies, machinery, and equipment being installed, constructed or rigged by the contractor in conjunction with its installation or construction. All items involved in the project including drainage/water sewer pipes, etc. (as included in description of project) need to be insured for the total completed replacement value. Coverage should include perils of fire, theft, vandalism, windstorm/hail, collapse and transit, sewer backup, testing, equipment breakdown, waterborne property. Coverage shall start when the items to be installed are transported to Owner premises and remain in place until the interest of the contractors ceases or the Owner accepts possession whichever comes first. Coverage should apply to owned property and non-owned property in the contractor's care, custody and control. The installation coverage forms shall provide coverage for building materials and supplies at the construction site, in transit to the site and similar property intended for the construction project at other locations as necessary or because of lack of storage space at the construction site. Coverage should apply on a Primary basis and should include a Waiver of Subrogation. Contractor should be responsible for any deductibles.

5. Policy Form:

a) All policies required by this Contract, with the exception of Workers Compensation, or unless specific approval is given by the Owner, are to be written on an occurrence basis, shall name the City of Venice, its Elected Officials, Officers, Agents, Employees as additional insured as their interest may appear under this Contract. Insurer(s), with the exception of Workers Compensation, shall agree to waive all rights of subrogation against the City of Venice, its Elected Officials, Officers, Agents, and Employees.

b) Insurance requirements itemized in this Contract, and required of the Contractor, shall be provided on behalf of all subcontractors to cover their operations performed under this Contract. The Contractor shall be held responsible for any modifications, deviations, or omissions in these insurance requirements as they apply to subcontractors.

c) Each insurance policy required by this Contract shall:

(1) apply separately to each insured against whom claim is made and suit is brought, except with respect to limits of the insurer's liability;

(2) be endorsed to state that coverage shall not be suspended, voided or canceled by either party except after thirty (30) calendar days prior written notice by certified mail, return receipt requested, has been given to the City of Venice's Director of Administrative Services.

d) The Owner shall retain the right to review, at any time, coverage form, and amount of insurance.

e) The procuring of required policies of insurance shall not be construed to limit Contractor's liability nor to fulfill the indemnification provisions and requirements of this Contract.

f) The Contractor shall be solely responsible for payment of all premiums for insurance contributing to the satisfaction of this Contract and shall be solely responsible for the payment of any deductible and/or retention to which such policies are subject, whether or not the Owner is an insured under the policy. In the event that claims in excess of the insured amounts provided herein are filed by reason of operations under the contract, the amount excess of such claims, or any portion thereof, may be withheld from any payment due or to become due to the Contractor until such time the contractor shall furnish additional security covering such claims as may be determined by the Owner.

g) Claims Made Policies will be accepted for professional and hazardous materials and such other risks as are authorized by the Owner. All Claims Made Policies contributing to the satisfaction of the insurance requirements herein shall have an extended reporting period option or automatic coverage of not less than two years. If provided as an option, the Contractor agrees to purchase the extended reporting period on cancellation or termination unless a new policy is affected with a retroactive date, including at least the last policy year.

h) Certificates of Insurance evidencing Claims Made or Occurrence form coverage and conditions to this Contract, as well as the Owner's Bid Number and description of work, are to be furnished to the City's Director of Administrative Services, 401 West Venice Avenue, Venice, FL 34285, ten

(10) business days prior to commencement of work and a minimum of thirty (30) calendar days prior to expiration of the insurance policy.

i) Notices of Accidents and Notices of Claims associated with work being performed under this Contract, shall be provided to the Contractor's insurance company and the City's Director of Administrative Services, as soon as practicable after notice to the insured.

j) All property losses shall be payable to, and adjusted with, the City.

SC-6.02.B Add new paragraphs immediately after Paragraph 6.02.B that are to read as follows:

SC-6.02.B.1 If it shall become absolutely necessary to perform Work at night or on Saturdays, Sundays, or legal holidays, written notice shall be submitted to Owner and Engineer at least 5 days in advance of the need for such Work. Owner will only consider the performance of such Work as can be performed satisfactorily under the conditions. Good lighting and all other necessary facilities for carrying out and observing the Work shall be provided and maintained where such Work is being performed at night.

SC-6.02.B.2 If Owner authorizes Work during other than regular working hours, Contractor shall reimburse Owner for all Owner's additional costs associated with such Work, including, but not necessarily limited to, the overtime costs for Owner's, Engineer's, and Resident Project Representative's personnel on the Site and other additional costs assessed against or incurred by the Owner. At Owner's option, such additional costs may either be deducted from Contractor's progress payments or deducted from the retained amount prior to release following Substantial Completion.

SC-6.07.B Change the first sentence of Paragraph 6.07.B by replacing the term "Owner and Engineer" with the term "Owner, Engineer, and Resident Project Representative".

SC-6.11.A.3. Change the first sentence of Paragraph 6.11.A.3. by replacing the term "Owner and Engineer" with the term "Owner, Engineer, and Resident Project Representative".

SC-6.12 Add a new paragraph immediately after Paragraph 6.12.A, that is to read as follows:

SC-6.12.B Contractor will be required to review with Engineer the status of record documents in connection with the Engineer's review of an Application for Payment. Failure to maintain record documents current may be just cause for Engineer to recommend withholding of payments for Work performed.

SC-6.15 Add a new paragraph immediately after Paragraph 6.15.A that is to read as follows:

SC-6.15.B Contractor shall be responsible for coordinating 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 all Laws and Regulations. Contractor shall provide a centralized location for the maintenance of the material safety data sheets or other hazard communication information required to be made available by any

employer on the Site. Location of the material safety data sheets or other hazard communication information shall be readily accessible to the employees of employers on the Site.

SC-6.17 Add the following new paragraphs immediately after Paragraph 6.17.E that are to read as follows:

SC-6.17.F Contractor shall furnish required submittals with sufficient information and accuracy to obtain required approval or acceptance of submittal with no more than two (2) submittals (initial submittal plus one re-submittal). Engineer will record Engineer's time for reviewing subsequent submittals of Shop Drawings, Samples, or other submittals or items requiring approval or acceptance, and Contractor shall reimburse Owner for Engineer's charges for such time.

SC-6.19.A Supplement Paragraph 6.19.A by adding, after the term, "Engineer" in the second sentence, the term "and Resident Project Representative".

SC-6.19.C.1. Supplement Paragraph 6.19.C.1. by adding, after the term, "Engineer" the term "or Resident Project Representative".

SC-6.20.A. Change the first sentence of Paragraph 6.20.A by replacing the term "Owner and Engineer" in the first sentence, with the term ", Owner, Engineer, and Resident Project Representative".

SC-6.20.B Change the first sentence of Paragraph 6.20.B by replacing the term "Owner or Engineer" with the term "Owner, Engineer or Resident Project Representative".

SC-7.03 Add a new paragraph immediately after Paragraph 7.02 that is to read as follows:

SC-7.03 *Separate Contractor Claims*

A. Should Contractor cause damage to the work or property of another contractor at the Site, or should any claim arising out of Contractor's performance of the Work at the Site be made by any other contractor against Contractor, Owner or Engineer or Resident Project Representative, Contractor, without involving any other party, shall either:

1. remedy the damage,

2. agree to compensate the other contractor for remedy of the damage, or

3. remedy the damage and attempt to settle with such other contractor by agreement, or otherwise resolve the dispute by arbitration or at law.

B. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner, Engineer, Resident Project Representative, 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 directly, indirectly, or consequentially out of or relating to any claim or action, legal or equitable, brought by any other contractor against Owner or Engineer or Resident Project Representative to the extent said claim is based upon Contractor's performance of the Work.

C. Should another contractor cause damage to the Work or property of Contractor at the Site or should the performance of work by any other contractor at the Site give rise to any other claim, Contractor shall not institute any action, legal or equitable, against Owner or Engineer or Resident Project Representative, or permit any action against any of them to be maintained and continued in its name or for its benefit in any court or before any arbiter which seeks to impose liability on or to recover damages from Owner or Engineer or Resident Project Representative on account of any such damage or claim.

D. If Contractor is delayed at any time in performing or furnishing Work by any act or neglect of another contractor and Owner and Contractor are unable to agree as to the extent of any adjustment in Contract Times attributable thereto, Contractor may make a Claim therefore in accordance with Article 12. An extension of the Contract Times shall be Contractor's exclusive remedy with respect to Owner or Engineer or Resident Project Representative for any delay, disruption, interference, or hindrance caused by any other contractor.

SC-8.01.A. Amend paragraph 8.01.A. by adding after the term "Engineer" to words "or Resident Project Representative".

SC-9.03 Add a new paragraph immediately after Paragraph 9.03.A that is to read as follows:

SC-9.03.B Resident Project Representative (RPR) will be Owner's employee or agent at the Site, will act as directed by and under the supervision of the Owner, and will confer with the Owner and Engineer regarding RPR's actions. RPR's dealings in matters pertaining to the Work in general shall be with Engineer and Contractor keeping Owner advised as necessary. RPR's dealings with Subcontractors shall only be through or with the full knowledge and approval of Contractor. RPR shall generally communicate with Owner with the knowledge of the Engineer.

1. Duties and Responsibilities of RPR:
    a. Schedules: Review the Progress Schedule, Schedule of Submittals, and Schedule of Values prepared by Contractor and consult with Owner and Engineer concerning acceptability.
    b. 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.
    c. Liaison:
        1) Serve as Owner's and Engineer's liaison with Contractor, working principally through Contractor's superintendent, and assist in providing understanding of the intent of the Contract Documents as directed by the Engineer.
        2) Assist in obtaining from Owner or Engineer additional details or information, when required for proper execution of the Work.
    d. Shop Drawings and Samples:
        1) Record date of receipt of Shop Drawings and Samples, that are received at the Site.
        2) Receive Samples that are furnished at the Site by Contractor, and notify Engineer of availability of Samples for examination.
        3) Advise Engineer and Contractor of the commencement of any Work requiring a Shop Drawing or Sample if the submittal has not been approved by Engineer.
    e. Review of Work, Rejection of Defective Work, Inspections and Tests:
        1) Conduct observations of the Work in progress on the Site to assist Engineer in determining if the Work is, in general, proceeding in accordance with the Contract Documents.
        2) Report to Engineer when RPR believes that any Work is unsatisfactory, faulty, or defective or does not conform generally to 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 Work that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection, or approval.
        3) Verify that tests, equipment, and systems startups, and operating and maintenance training are conducted in the presence of appropriate Owner's personnel, and that Contractor maintains adequate records thereof; and observe, record, and report to Engineer appropriate details relative to the test procedures and startups.
        4) Accompany visiting inspectors representing public or other agencies having jurisdiction over the Project, record the results of these inspections and report to Engineer.

f. 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.

g. Modifications: Consider and evaluate Contractor's suggestions for modifications to Drawings or Specifications and report with RPR's recommendations to Engineer. Transmit to Contractor decisions issued by Engineer.

h. Records:

1) Maintain at the Site orderly files for correspondence, reports of job conferences, Shop Drawings and Samples, and reproductions of original Contract Documents including all Addenda, Change Orders, Work Change Directives, Field Orders, additional Drawings issued subsequent to the execution of the Agreement, Engineer's clarifications and interpretations of the Contract Documents, progress reports, and other Project-related documents.

2) Keep a record recording Contractor's hours, personnel and equipment on the Site, weather conditions, data relative to questions on Change Orders or changed conditions, list of visitors to the Site, 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.

3) Record names, addresses, and telephone numbers of all Contractors, Subcontractors, and major Suppliers of materials and equipment.

i. Reports:

1) Furnish Engineer periodic reports as required of progress of the Work and of Contractor's compliance with the Progress Schedule and Schedule of Submittals.

2) Consult with Engineer in advance of scheduled major tests, inspections, or start of important phases of the Work.

3) Report immediately to Engineer and Owner upon the occurrence of any Site accident, any Hazardous Environmental Condition, emergencies or acts of God endangering the Work, or property damage by fire or other cause.

j. Payment Requests: Review Applications for Payment with Contractor for compliance with the established procedure for their submission, and submit 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.

k. Certificates, Maintenance and Operation Manuals: During the course of the Work, verify that certificates, maintenance and operation manuals, and other data required by the Specifications to be assembled and furnished by Contractor are applicable to the items actually

installed and in accordance with the Contract Documents, and have this material delivered to Engineer for review and forwarding to Owner prior to final payment for the Work.

l. Completion:
   1) Before Engineer issues a certificate of Substantial Completion, submit to Contractor a list of observed items requiring completion or correction.
   2) Observe whether Contractor has arranged for inspections required by Laws and Regulations, including but not limited to those to be performed by public authorities having jurisdiction over the Work.
   3) Conduct final inspection in the company of Engineer, Owner, and Contractor, and prepare a final list of items to be completed or corrected.
   4) Observe that all items on final list have been completed or corrected and make recommendations to Engineer concerning acceptance of the Work.

2. The RPR shall not:
   a. Authorize any deviation from the Contract Documents or substitution of materials or equipment, including "or equal" items.
   b. Exceed limitations of Engineer's authority as set forth in the Contract Documents.
   c. Undertake any of the responsibilities of Contractor, Subcontractors, or Contractor's superintendent.
   d. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of construction, unless such advice or directions are specifically required by the Contract Documents.
   e. Advise on, issue directions regarding, or assume control over safety precautions and programs in connection with the Work.
   f. Accept Shop Drawing or Sample submittals from anyone other than Contractor.
   g. Authorize Owner to occupy the Project in whole or in part.
   h. Participate in specialized field or laboratory tests or inspections conducted by others except as specifically authorized by Engineer.

SC-9.08.A Change "30 days" in the last sentence to read "10 days".

SC-10.05.B Delete paragraph B in its entirety and replace with the following:.

Notice: Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 10 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 30 days after

the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).

SC-12.01.C Delete the semicolon at the end of GC 12.01.C.2.c, and add the following:

provided, however, that on any subcontracted work the total maximum fee to be paid by Owner to Contractor under this Paragraph shall be no greater than 27 percent of the costs incurred by the Subcontractor who actually performs the work;

SC-12.03.C. Change the first sentence of Paragraph 12.03.C by replacing the term "Owner and Engineer" in the first sentence, with the term "Owner, Engineer, and Resident Project Representative".

SC-12.03.E. Change the first sentence of Paragraph 12.03.E by replacing the term "Owner and Engineer" in the first sentence, with the term "Owner, Engineer, and Resident Project Representative".

SC-13.01.A. Change the first sentence of Paragraph 13.01.A. by replacing the term "Owner or Engineer" with the term "Owner, Engineer, or Resident Project Representative".

SC-13.03.A. Change the first sentence of Paragraph 13.03.A. by replacing the term "Engineer" with the term "Engineer and Resident Project Representative".

SC-13.03.B. Delete Paragraph 13.03.B. and subparagraphs in their entirety and replace with the following:

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

SC-13.04.A. Delete Paragraph 13.04.A. in its entirety and replace with the following:

A. If any Work is covered contrary to the written request of Engineer or Resident Project Representative, it must, if requested by Engineer or Resident Project Representative, be uncovered for Engineer's or Resident Project Representative's observation and replaced at Contractor's expense.

SC-13.04.D. Change the words “If, the uncovered work is not found to be defective,” to read “Unless the Contractor was provided with prior written request not to cover the work, if the uncovered work is not found to be defective,”.

SC-14.02.A Add new paragraphs immediately after Paragraph 14.02.A.3 that are to read as follows:

SC-14.02.A.4. Owner shall make monthly progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment as recommended by Engineer. Contractor's Applications for Payment will be due within 7 days after the last day of each month during performance of the Work. All progress payments will be on the basis of the progress of the Work measured by the Schedule of Values provided for in Paragraph 2.07.A of the General Conditions (and in the case of Unit Price Work, based on the number of units completed) or, in the event there is no Schedule of Values, as provided in the General Requirements. A progress payment will not be made whenever the value of the Work completed since the last previous progress payment is less than $5,000.

1. Prior to Substantial Completion

   a. Progress payments will be made in the amount of up to 90 percent of the Work completed, (with the balance being retainage), less the aggregate of payments previously made and less such amounts as Engineer shall determine, or Owner may withhold, in accordance with Paragraph 14.02 of the General Conditions; and

   b. 90 percent of the cost of materials and equipment not incorporated in the Work but suitably stored (with the balance being retainage).

2. 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 as Engineer shall determine in accordance with Paragraph 14.02.B.5 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 tentative list of items to be completed or corrected attached to the certificate of Substantial Completion.

SC-14.02.C. Replace the existing paragraph with the following:

All payments to Contractor shall be made in accordance with Florida’s Local Government Prompt Payment Act.

SC-14.04.B. Change the terms “Owner, Contractor and Engineer” to read “Owner, Contractor, Engineer and Resident Project Representative”.

SC-14.07.C. Replace the existing paragraph with the following:

All payments to Contractor shall be made in accordance with Florida's Local Government Prompt Payment Act.

SC-16.01 Add new paragraphs immediately after Paragraph 16.01.A that are to read as follows:

SC-16.01.B Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.

SC-16.01.C Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.

SC-16.01.D If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor,

1. elects in writing to demand arbitration of the Claim, pursuant to Paragraph SC-16.02, or

2. agrees with the other party to submit the Claim to another dispute resolution process.

SC-16.02 Add a new paragraph immediately after Paragraph 16.01 that is to read as follows:

SC-16.02 *Arbitration*

A. All Claims or counter claims, disputes, or other matters in question between Owner and Contractor arising out of or relating to the Contract Documents or the breach thereof (except for Claims that have been waived by the making or acceptance of final payment as provided by Paragraph 14.09), including but not limited to those not resolved under the provisions of Paragraph SC-16.01.B and SC-16.01.C will be decided by arbitration in accordance with Construction Industry Arbitration Rules of the American Arbitration Association, subject to the conditions and limitations

of this Paragraph SC-16.02. 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 30-day period specified in Paragraph SC-16.01.D. and in all other cases within a reasonable time after the Claim or counter claim, dispute, or other 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 Claim or counter claim, dispute, or other matter in question would be barred by the applicable statute of limitations.

C. No arbitration arising out of or relating to the Contract Documents shall include by consolidation, joinder, or in any other manner any individual or entity (including Engineer, Resident Project Representative, and the officers, directors, partners, employees, agents, or consultants of each and any of them) who is not 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, and

D. The award rendered by the arbitrator(s) shall be:

1. consistent with the agreement between the parties, and

2. in writing, and shall include:

a. a concise breakdown of the award, and

b. a written explanation of the award specifically citing the Contract Document provisions deemed applicable and relied on in making the award.

E. Subject to provisions of the Controlling Law relating to vacating or modifying an arbitration award, 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.

F. The fees and expenses of the arbitrator(s) and any arbitration service shall be shared equally by Owner and Contractor.

SC-17.07 Add a new paragraph immediately after Paragraph 17.06 that is to read as follows:

SC-17.07 *Confidential Information*

A. All Drawings, Specifications, technical data, and other information furnished to Contractor either by Owner or Engineer or developed by Contractor or others in connection with the Work are, and will remain, the property of Owner or Engineer, and shall not be copied or otherwise reproduced or used in any way except in connection with the Work, or disclosed to third parties or used in any manner detrimental to the interests of Owner or Engineer.

B. The following information is not subject to the above confidentiality requirements:

1. information in the public domain through no action of Contractor in breach of the Contract Documents; or

2. information lawfully possessed by Contractor before receipt from Owner or Engineer; or

3. information required to be disclosed by Laws or Regulations, or by a court or agency of competent jurisdiction. However, in the event Contractor shall be so required to disclose such information, Contractor shall, prior to disclosure, provide reasonable notice to Owner and Engineer, who shall have the right to interpose all objections Owner may have to the disclosure of such information.

SC-18 Add new Article immediately after Article 17, which is to read as follows:

ARTICLE SC-18 – STATUTORY REQUIREMENTS

SC-18.01 This Article contains portions of certain Laws or Regulations which, by provision of Laws or Regulations, are required to be included in the Contract Documents. The material included in this Article may not be complete or current. Contractor's obligation to comply with all Laws and Regulations applicable to the Work is set forth in Paragraph 6.09 of the General Conditions.

+ + END OF SPECIAL CONDITIONS + +

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"City on the Gulf"

CITY OF VENICE, FLORIDA

Purchasing Department

401 W. Venice Avenue
Venice, FL 34285

Invitation to Bid

ITB Number 3083-18

Date of Issue: March 10, 2018

Submission Deadline: April 10, 2018 at 2:00 PM

Title and Purpose of ITB:

EWRF Lift Station Force Main Relocation and Reaeration Blower Replacement Projects

Volume 2

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CITY OF VENICE
EWRF LIFT STATION FORCE MAIN RELOCATION AND REAERATION BLOWER REPLACEMENT PROJECTS

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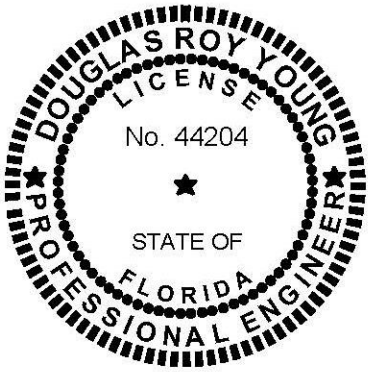
CITY OF VENICE
EASTSIDE WATER RECLAMATION FACILITY PLANT
LIFT STATION FORCE MAIN RELOCATION



THIS ITEM HAS BEEN DIGITALLY SIGNED AND SEALED
BY DOUGLAS R. YOUNG ON THE DATE INDICATED.

PRINTED COPIES OF THIS DOCUMENT ARE NOT
CONSIDERED SIGNED AND SEALED AND THE SIGNATURE
MUST BE VERIFIED ON ANY ELECTRONIC COPIES.

Douglas R. Young, PE
FL Professional Engineer No. 44204
Jones Edmunds & Associates, Inc.
Certificate of Authorization #1841
Divisions 1, 2, 9, and 15

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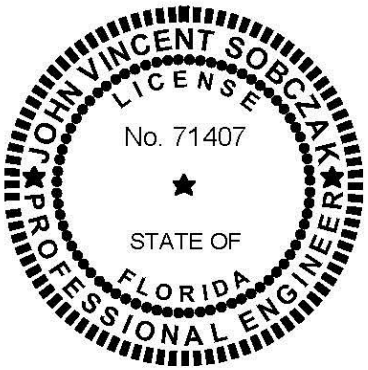
CITY OF VENICE
EASTSIDE WATER RECLAMATION FACILITY PLANT
LIFT STATION FORCE MAIN RELOCATION



THIS ITEM HAS BEEN DIGITALLY SIGNED AND SEALED BY JOHN VINCENT SOBCZAK ON THE DATE INDICATED.

PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THE SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES.

John V. Sobczak, PE
FL Professional Engineer No. 71407
Wekiva Engineering LLC
711 N. Orange Avenue, Suite A
Certificate of Authorization #31920
Divisions 3 and 5

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SECTION 01000
PROJECT REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Work to be done consists of the furnishing of all labor, materials, and equipment and the performance of all Work included in this Contract. The summary of the Work is presented in Section 01100, Summary of Work. The term "Engineer" used within these specifications may refer to the Owner, the Owner's representative(s), or the design Engineer of Record.

B. Work Included:

1. The Contractor shall furnish all labor, superintendence, materials, plant power, light, heat, fuel, water, tools, appliances, equipment, supplies, and means of construction necessary for proper performance and completion of the Work. The Contractor shall obtain and pay for all necessary local building permits. The Contractor shall perform and complete the Work in the manner best calculated to promote rapid construction consistent with safety of life and property and to the satisfaction of the Engineer and in strict accordance with the Contract Documents. The Contractor shall clean up the Work and maintain it during and after construction, until accepted, and shall do all Work and pay all costs incidental thereto. He shall repair or restore all structures and property that may be damaged or disturbed during performance of the Work.
2. The cost of incidental work described in these Project Requirements for which there are no specific Contract Items shall be considered as part of the general cost of doing the Work and shall be included in the prices for the various Contract Items. No additional payment will be made therefore.
3. The Contractor shall provide and maintain such modern plant, tools, and equipment as may be necessary, in the opinion of the Engineer, to perform in a satisfactory and acceptable manner all the Work required by this Contract. Only equipment of established reputation and proven efficiency shall be used. The Contractor shall be solely responsible for the adequacy of his workmanship, materials, and equipment, prior approval of the Engineer notwithstanding.

C. Public Utility Installations and Structures:

Public utility installations and structures shall be understood to include all poles, tracks, pipes, wires, conduits, vaults, manholes, and all other appurtenances and

facilities pertaining thereto whether owned or controlled by the Owner, other governmental bodies, or privately owned by individuals, firms, or corporations used to serve the public with transportation, traffic control, gas, electricity, telephone, sewerage, drainage, water, or other public or private property which may be affected by the Work shall be deemed included hereunder.

1. The Contract Documents contain data relative to existing public utility installations and structures above and below the ground surface. These data are not guaranteed as to their completeness or accuracy and it is the responsibility of the Contractor to make his own investigations to inform himself fully of the character, condition, and extent of all such installations and structures as may be encountered and as may affect the construction operations.
2. The Contractor shall protect all public utility installations and structures from damage during the Work. Access across any buried public utility installation or structure shall be made to avoid any damage to these facilities. All required protective devices and construction shall be provided by the Contractor at his expense. All existing public utilities damaged by the Contractor shall be repaired by the Contractor, at his expense. No separate payment shall be made for such protection or repairs to public utility installations or structures.
3. Public utility installations or structures owned or controlled by the Owner or other governmental body which are shown on the Drawings to be removed, relocated, replaced, or rebuilt by the Contractor shall be considered as a part of the general cost of doing the Work and shall be included in the prices bid for the various Contract Items. No separate payment shall be made therefor.
4. Where public utility installations of structures owned or controlled by the Owner or other governmental body are encountered during the Work and are not indicated on the Drawings or in the Specifications, and when, in the opinion of the Engineer, removal, relocation, replacement, or rebuilding is necessary to complete the Work under this Contract, such Work shall be accomplished by the utility having jurisdiction, or such Work may be ordered, in writing by the Engineer, for the Contractor to accomplish. If such work is accomplished by the utility having jurisdiction it will be carried out expeditiously, and the Contractor shall give full cooperation to permit the utility to complete the removal, relocation, replacement, or rebuilding as required. If such work is accomplished by the Contractor, it will be paid for as extra work as provided in the Agreement.
5. At all times in performance of the Work the Contractor shall employ acceptable methods and exercise reasonable care and skill so as to avoid unnecessary delay, injury, damage, or destruction of public utility installations and structures and shall at all times in the performance of the

Work avoid unnecessary interference with or interruption of public utility services and cooperate fully with the owners thereof to that end.

6. The Contractor shall give written notice to the Owner and other governmental utility departments and other owners of public utilities of the location of his proposed construction operations at least 48 hours in advance of breaking ground in any area or on any unit of the Work.

7. The maintenance, repair, removal, relocation, or rebuilding of public utility installations and structures, when accomplished by the Contractor as herein provided, shall be done by methods approved by the owners of such utilities.

1.02 RELATED WORK (NOT USED)

1.03 SUBMITTALS (NOT USED)

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS (NOT USED)

1.06 QUALITY ASSURANCE (NOT USED)

1.07 WARRANTIES

A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, for storing and protecting the items specified in this Section.

1.09 QUALIFICATIONS (NOT USED)

1.10 DRAWINGS AND PROJECT MANUAL

A. Drawings: When obtaining data and information from the Drawings, figures shall be used in preference to scaled dimensions and large-scale drawings in preference to small-scale drawings.

B. Supplementary Drawings:

1. When, in the opinion of the Engineer, it becomes necessary to explain more fully the Work to be done or to illustrate the Work further or to show

any changes which may be required, the Engineer will prepare drawings known as Supplementary Drawings, with specifications pertaining to such Drawings, and the Contractor will be furnished one complete set of reproducible black line prints (22 inches by 34 inches) and one reproducible copy of the specifications.

2. The Supplementary Drawings shall be binding upon the Contractor with the same force as the Contract Drawings. Where such Supplementary Drawings require either less or more than the estimated quantities of Work, credit to the Owner or compensation therefor to the Contractor shall be subject to the terms of the Agreement.

C. Contractor to Check Drawings and Data:

1. The Contractor shall verify all dimensions, quantities, and details shown on the Drawings, Supplementary Drawings, Schedules, Specifications, or other data received from the Engineer, and shall notify the Engineer of all errors, omissions, conflicts, and discrepancies found therein. Failure to discover or correct errors, conflicts, or discrepancies shall not relieve the Contractor of full responsibility for unsatisfactory work, faulty construction, or improper operation resulting therefrom, nor from rectifying such conditions at his own expense. He will not be allowed to take advantage of any errors or omissions, as full instructions will be furnished by the Engineer should such errors or omissions be discovered.
2. All schedules are given for the convenience of the Engineer and the Contractor and are not guaranteed to be complete. The Contractor shall assume all responsibility for making estimates of the size, kind, and quantity of materials and equipment included in the Work to be done under the Contract.

D. Specifications: The Technical Specifications each consist of three parts: General, Products, and Execution. The General part of a Specification contains General Requirements which govern the Work. The Products and Execution parts modify and supplement the General Requirements by detailed requirements for the Work and shall always govern whenever there appears to be a conflict.

E. Intent:

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

2. The apparent silence of the Specifications as to any detail or the apparent omission from them of a detailed description concerning any work to be done and materials to be furnished shall be regarded as meaning that only the best general practice is to prevail and that only material and workmanship of the best quality is to be used. The interpretation of these Specifications shall be made upon that basis.

1.11 MATERIALS AND EQUIPMENT

A. Manufacturer:

1. All transactions with the manufacturers or subcontractors shall be through the Contractor, unless the Contractor shall request and at the Engineer's option that the manufacturer or subcontractor deal directly with the Engineer. Any such transactions shall not in any way release the Contractor from his full responsibility under this Contract.
2. Any two or more pieces of material or equipment of the same kind, type, or classification, and being used for identical types of service, shall be made by the same manufacturer.

B. Delivery:

1. The Contractor shall deliver materials in ample quantities to ensure the most speedy and uninterrupted progress of the Work so as to complete the Work within the allotted time.
2. The Contractor shall also coordinate deliveries in order to avoid delay in or impediment of the progress of the work of any related Contractor.
3. The Contractor shall make arrangements to physically receive ALL deliverables to project site.

C. Tools and Accessories:

1. Unless otherwise stated in the Contract Documents, the Contractor shall furnish with each type, kind, or size of equipment, one complete set of suitably marked high-grade special tools and appliances which may be needed to adjust, operate, maintain, or repair the equipment. Such tools and appliances shall be furnished in approved painted steel cases, properly labeled and equipped with good-grade cylinder locks and duplicate keys.
2. Spare parts shall be furnished as specified herein and as recommended by the manufacturer necessary for the operation of the equipment, not including materials required for routine maintenance.
3. Each piece of equipment shall be provided with a substantial nameplate, securely fastened in place and clearly inscribed with the manufacturer's name, year of manufacture, serial number, weight, and principal rate data.

D. Service of Manufacturer's Engineer:

1. The Contract Prices for equipment shall include the cost of furnishing a competent and experienced engineer or superintendent who shall represent the manufacturer and shall help the Contractor, when required, install, adjust, test, and place in operation the equipment in conformity with the Contract Documents.
2. After the equipment is placed in permanent operation by the Owner, the engineer or superintendent shall make all adjustments and tests required by the Engineer to prove that the equipment is in proper and satisfactory operating condition and shall instruct such personnel as may be designated by the Owner in the proper operation and maintenance of such equipment.

1.12 INSPECTION AND TESTING

A. General:

1. For tests specified to be made by the Contractor, the testing personnel shall make the necessary inspections and tests, and the reports thereof shall be in such form as will facilitate checking to determine compliance with the Contract Documents. Five copies of the reports shall be submitted and authoritative certification thereof must be furnished to the Engineer as a prerequisite for the acceptance of any material or equipment.
2. If, in the making of any test of any material or equipment, the Engineer ascertains that the material or equipment does not comply with the Contract Documents, the Contractor will be notified thereof and he will be directed to refrain from delivering said material or equipment, or to remove it promptly from the site or from the Work and replace it with acceptable material without cost to the Owner.
3. Tests of electrical and mechanical equipment and appliances shall be conducted in accordance with the recognized test codes of ANSI, ASME, or IEEE, except as may otherwise be stated herein.
4. The Contractor shall be fully responsible for the proper operation of equipment during testing and instruction periods and shall neither have nor make any claim for damage which may occur to equipment before the time when the Owner formally takes over the operation thereof.

B. Costs:

1. The Contractor shall provide all inspection and testing of materials furnished under this Contract, unless otherwise expressly specified.

2. The Contractor shall bear the cost of shop and field tests of equipment and of certain other tests specifically called for in the Contract Documents, and such costs shall be deemed to be included in the Contract Price.
3. The Owner may test materials and equipment submitted by the Contractor as the equivalent to those specifically named in the Contract for compliance. The Contractor shall reimburse the Owner for the expenditures incurred in making such tests of materials and equipment which are rejected for non-compliance.

C. Certificate of Manufacture:

1. The Contractor shall furnish the Engineer with authoritative evidence in the form of a certificate of manufacture that the materials to be used in the Work have been manufactured and tested in conformity with the Contract Documents.
2. These certificates shall be notarized and shall include copies of the results of physical tests and chemical analyses, where necessary, that have been made directly on the product or on similar products of the manufacturer.

D. Shop Tests:

1. Each piece of equipment for which pressure, duty, capacity, rating, efficiency, performance, function, or special requirements are specified shall be tested in the shop of the maker in a manner which shall conclusively prove that its characteristics comply fully with the requirements of the Contract Documents.
2. Five copies of the manufacturer's actual test data and interpreted results thereof, accompanied by a certificate of authenticity sworn to by a responsible official of the manufacturing company and/or independent laboratory, shall be submitted to the Engineer for approval.
3. The Contractor shall bear the cost of shop tests and of furnishing manufacturer's preliminary and shop test data of operating equipment.

E. Start-up Tests:

1. As soon as conditions permit, the Contractor shall furnish all labor, materials, and instruments and shall make start-up tests of equipment.
2. If the start-up tests disclose any equipment furnished under this Contract which does not comply with the requirements of the Contract Documents, the Contractor shall, before demonstration tests, make all changes, adjustments, and replacements required. The furnishing contractor shall assist in the start-up tests as applicable.

F. Demonstration Tests:

1. Before the Contractor's request for a Substantial Completion inspection, all equipment and piping installed under this Contract shall be subjected to demonstration tests as specified or required to prove compliance with the Contract Documents.
2. The Contractor shall furnish labor, fuel, energy, water, and all other materials, equipment, and instruments necessary for all demonstration tests at no additional cost to the Owner. The Contractor shall assist in the demonstration tests as applicable.

1.13 LINES AND GRADES

A. Grade:

1. All work under this Contract shall be constructed in accordance with the lines and grades shown on the Drawings or as given by the Engineer. The full responsibility for keeping alignment and grade shall rest upon the Contractor.
2. The Engineer will establish bench marks and provide coordination points. Reference marks for lines and grades as the Work progresses will be located by the Contractor to cause as little inconvenience to the prosecution of the Work as possible. The Contractor shall place excavation and other materials so as to cause no inconvenience in the use of the reference marks provided. He shall remove any obstructions he places contrary to this provision.

B. Surveys:

1. At his own expense the Contractor shall furnish and maintain stakes and other such materials.
2. The Contractor shall check such reference marks by such means as he may deem necessary and, before using them, shall call the Engineer's attention to any inaccuracies.
3. At his own expense the Contractor shall establish all working or construction lines and grades as required from the reference marks set by the Engineer and shall be solely responsible for the accuracy of these lines and grades. He shall, however, be subject to check and review by the Engineer.

C. Safeguarding Marks:

1. The Contractor shall safeguard all points, stakes, grade marks, monuments, and bench marks made or established on the Work, bear the

cost of re-establishing them if disturbed, and bear the entire expense of rectifying work improperly installed due to not maintaining or protecting or to removing without authorization such established points, stakes, and marks.

2. The Contractor shall safeguard all existing and known property corners, monuments, and marks adjacent to but not related to the Work and shall bear the cost of re-establishing them if they are disturbed or destroyed.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01100
SUMMARY OF WORK

PART 1 GENERAL

1.01 SCOPE OF WORK

Unless otherwise expressly provided in the Contract Documents, the Work must be performed in accordance with best modern practice, with materials and workmanship of the highest quality to the satisfaction of the Owner.

A. The Project title is **City of Venice Eastside Water Reclamation Facility Plant Lift Station Force Main Relocation**.

B. The Work of this Project is defined in the Agreement.

C. The Specification divisions and Drawings are an integrated part of the Contract Documents and, as such, will not stand alone if used independently as individual sections, divisions, or drawing sheets. The Drawings and Specifications establish minimum standards of quality for this project. They do not purport to cover all details entering into the design and construction of materials and equipment.

1.02 RELATED WORK (NOT USED)

1.03 SUBMITTALS (NOT USED)

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to herein shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

A. American Association of State Highway and Transportation Officials (AASHTO) Formerly (AASHO)
B. American Concrete Institute (ACI)
C. American Institute of Steel Construction (AISC)
D. American Iron and Steel Institute (AISI)
E. American National Standards Institute (ANSI)
F. American Standards Association (ASA)
G. American Society of Mechanical Engineers (ASME)

H. American Society of Testing and Material (ASTM)
I. American Water Works Association (AWWA)
J. American Welding Society (AWS)
K. Anti-Friction Bearing Manufacturer's Association (AFBMA)
L. Building Officials and Code Administrators International, Inc. (BOCA)
M. Construction Specifications Institute (CSI)
N. Federal Specification (FS)
O. Florida Department of Transportation (FDOT) Standard Specifications for Road and Bridge Construction, Latest English Edition (Standard Specifications)
P. FDOT Roadway and Traffic Design Standards Latest English Edition (FDOT Index)
Q. Geosynthetics Institute (GSI)
R. National Bureau of Standards (NBS)
S. National Electrical Manufacturer's Association (NEMA)
T. National Fire Protection Association (NFPA)
U. Portland Cement Association (PCA)
V. Occupational Safety and Health Act (Public Law 91-596), U.S. Department of Labor (OSHA)
W. Steel Structures Painting Council (SSPC)
X. Southern Standard Building Code (SSBC)
Y. Underwriters' Laboratories, Inc. (UL)
Z. United States of America Standards Institute (USASI)
AA. Regulations of Florida Industrial Commission Regarding Safety
BB. All local, state, county, or municipal building codes requirements of the Owner's Insurance

1.06 QUALITY ASSURANCE (NOT USED)

1.07 WARRANTIES

A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, for storing and protecting the items specified in this Section.

1.09 QUALIFICATIONS (NOT USED)

1.10 GENERAL REQUIREMENTS

A. Unless otherwise specified on the Construction Drawings or Specifications, all work and the quality of materials shall conform to the referenced sections of the Florida Department of Transportation (FDOT) *Standard Specifications for Road and Bridge Construction, Supplementary Specifications*, and *Roadway and Traffic Design Standards*. The Contractor shall retain on the job site copies of these standard FDOT documents. The basis of payment shall conform to Section 01200, Measurement and Payment, of the General Requirements.

1.11 WORKING HOURS

A. Work under this contract shall not be prosecuted on Saturdays, Sundays or on City holidays, except in time of emergency, and then only under written permission from the Owner who shall be the sole judge as to the urgency of that situation. On weekdays , the workday shall be limited to daylight hours between the hours of 7 AM and 4 PM.

B. If the Contractor deems it necessary to work on Sundays, holidays, or beyond daylight hours to comply with his construction schedule or because of an emergency, the Contractor shall request permission of the Owner to do so with 72 hours advanced notice. If, in the opinion of the Owner, the need is bona fide, the Owner will authorize the Contractor to work such hours as may be necessary.

1.12 REIMBURSEMENT FEES

A. The following hourly rates shall be applied as the Owner’s reimbursement of the Engineer’s fee to be paid by the Contractor for expenses incurred due to Contractor's working beyond regular working hours, for evaluation of substitutions, for costs generated as a result of more than two submittals of any one Shop Drawing or Sample being required for evaluation due to rejection for noncompliance of the original submittal or for lack of information required by the Contract Documents, for any additional field observations, engineering analysis, correspondence, meetings, or other work due to non-complying or defective construction, materials, or equipment performed or furnished by the Contractor, Subcontractors, or Suppliers, for all costs due to work not being ready for tests and/or inspections when the Contractor has notified Engineer that work is ready for tests and/or inspections, and for retests resulting from failed tests.

1.	Senior Field Representative (Construction):	$105
2.	Senior Construction Administrator:	$150
3.	Engineering Consultant (Senior Project Manager):	$205
4.	Administrative Assistant:	$ 65

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01200
MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section covers methods of measurement and payment for items of work under this Contract.

B. The total Contract Price shall cover all work required by the Contract Documents. All cost in connection with the proper and successful completion of the work, including furnishing all materials, equipment, and tools and performing all necessary labor and supervision to fully complete the work, shall be included in the unit price and lump-sum Bid prices. All work not specifically set forth as a pay item in the Bid Form or Bid Schedule shall be considered a subsidiary/ancillary obligation of the Contractor and all costs in connection with these subsidiary/ancillary obligations shall be included in the Bid(s) to provide a complete and functional Project.

1.02 RELATED WORK (NOT USED)

1.03 SUBMITTALS (NOT USED)

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS (NOT USED)

1.06 QUALITY ASSURANCE (NOT USED)

1.07 WARRANTIES

A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, for storing and protecting the items specified in this Section.

1.09 QUALIFICATIONS (NOT USED)

1.10 EXCAVATION, TRENCHING, AND CLEARING

A. Except where otherwise specified, the unit price or lump-sum price bid for each item of work which involves excavation, trenching, clearing, grubbing, or disposal of cleared and grubbed materials shall include all costs for such work. No direct payment shall be made for clearing, grubbing, disposal of cleared or grubbed materials, excavation, trenching, disposal of surplus excavated material, handling water (and groundwater) and purchasing and hauling of required fill material. All excavation and trenching shall be unclassified as to materials which may be encountered; in addition, trenches shall be unclassified as to depth, unless otherwise stated.

1.11 LUMP SUM

A. For lump-sum items, payments shall be made to the Contractor in accordance with an accepted Progress Schedule of Values on the basis of actual work completed and accepted by the Owner at the final completion of the Project.

1.12 UNIT PRICE

A. For unit price items, payment shall be made based on the actual amount of work accepted by the Owner and for the actual amount of materials in place at the final completion of the Project, as confirmed by the final measurements.

B. After the work is completed and before final payment is made, the Engineer will make final measurements, with all required assistance from the Contractor, to determine the quantities of various items of work accepted as the basis for the final unit price payment.

1.13 PAYMENT FOR INCREASED OR DECREASED QUANTITIES

A. When alterations in the quantities of unit price work not requiring a Change Order(s), as herein provided for, are ordered and performed, the Contractor shall accept payment in full at the Contract unit price multiplied by the actual quantities of work constructed and accepted by the Owner at the completion of the project.

B. The actual percentage of each lump sum bid item completed by the Contractor and accepted by the Owner at the final completion of the Project will be paid to the Contractor.

1.14 DELETED ITEMS

A. Should any items contained in the Bid Schedule(s) be found unnecessary for the proper completion of the work contracted, the Engineer may eliminate such items from the Contract. This action shall in no way invalidate the Contract and no financial allowance or compensating payment for anticipated profit, overhead, etc., will be made for items so eliminated in making final payment to the Contractor.

1.15 PARTIAL PAYMENTS

A. Partial payments shall be made monthly as the work progresses. Partial payment shall be made subject to the provisions of the General and Supplementary Conditions.

1.16 PAYMENT FOR STORED MATERIAL DELIVERED TO THE PROJECT

A. When requested by the Contractor and at the discretion of the Owner, payment may be made for all or part of the value of acceptable materials and equipment to be incorporated into bid items, which have not been used, and which have been delivered to the construction site or placed in storage places acceptable to the Owner. The Contractor shall provide receipts for all stored material items requested for reimbursement which clearly identify the stored material item, where it is to be constructed, the unit cost of the item, as well as the total cost of the delivered item(s), the quantity of the item, the brand name of the item, and the supplier. Note that there are additional documentation requirements and storage requirements within the Contract Documents that must also be met before the Contractor can be reimbursed for these stored materials.

B. No payment shall be made for fuels, supplies, installation or connection hardware, lumber, false work, or other similar materials or on temporary structures or other work (items) of any kind which are not a permanent part of the Contract. Items having a value of less than $2,500 shall not be compensated for as a stored material item.

1.17 FINAL PAYMENT

A. If requested by the Engineer, the Contractor shall field verify all quantities in dispute by using visual observation, taped measurements, or other methods designated by the Engineer. The field verification shall be made in the presence of the Engineer and agreed to by both the Engineer and the Contractor. The Engineer will prepare a final adjusting Change Order which will adjust the final quantities of the project Bid Schedule to reflect the actual work accepted by the Owner and for which the Contractor will be compensated.

1.18 SCHEDULE OF VALUES

A. A schedule of values for the lump-sum bid items and some of the unit price bid items as required by the Engineer shall be submitted and accepted before the first pay request is approved by the Engineer. The schedule of values shall be based on the prices bid in the Bid Schedule(s). Prices bid in the Bid Schedule(s) cannot be changed in the schedule of values; they can only be broken down into more detail so that the Engineer can more accurately review and approve the Contractor's pay application for the completed work.

1.19 MISCELLANEOUS CONSTRUCTION ITEMS

A. The Contractor shall take all precautions necessary to protect existing utilities, roads, and miscellaneous items from damage during construction.

B. The Contractor shall repair, relocate, or replace existing utilities, roadways, and miscellaneous items to pre-construction conditions.

C. All repairs, relocations, and replacements necessary are considered incidental to the work and will be at the Contractor's cost, with no cost to the Owner.

D. The unit-price bid items and lump-sum bid items for all pipe items shall constitute full compensation for furnishing, laying, jointing, and testing of pipe; dewatering; excavation and backfill; and cleanup. All pipe lines, including but not limited to sewer lines, concentrate disposal lines, water lines, force mains and gravity sewer lines, which are to be paid for per linear foot in the Bid Schedule, will be measured for payment only on a horizontal plane after installation, unless otherwise noted.

E. The Contractor shall have the Engineer observe and document the installation of each underground fitting on the project. If the installation of any fitting is not confirmed and documented by the Engineer, it shall not be paid for by the Owner.

PART 2 PAY ITEM DESCRIPTIONS

2.01 BID

The descriptions provided in the following Paragraphs are to be used by the Bidder in preparing the Bid Schedule. They generally indicate how the major workscope items and their respective costs are to be separated into the line items listed in the Bid Schedule. These descriptions are not fully representative nor all inclusive of the work required to complete the project in accordance with the Contract Documents. It is the Bidder's responsibility to include all required costs within the most appropriate line item(s).

Item 1. Mobilization/Demobilization (not to exceed 5% of Total Base Bid)—This item shall include and cover the costs for performing construction, preparatory, and overhead operations, including but not limited to movement of personnel and equipment to and from the site, sanitary facilities, project administration and management, insurance, bonds, Owner and Engineer indemnification, temporary utilities, permits related to construction, and all other similar activities and facilities necessary for executing this project. This item shall not exceed 8% of the Total Base Bid. The Contractor shall be paid 40% of this item upon completion of mobilization, 3% per month for general conditions, with the remainder paid upon demobilization.

Item 2. Demolition and Temporary Access

Item 2a. Remove Stairway and Protect for Relocation—This lump sum item shall include, but not be limited to, all labor, materials, and equipment necessary to disassemble the existing headworks stairway and protect it for relocation, to furnish and install handrails and kick plates where necessary at open areas after removal of the stairway. The Contractor shall be paid based on the percentage completed at each application for payment.

Item 2b. Demolish Stairway Slab—This lump sum item shall include, but not be limited to, all labor, materials, and equipment necessary to demolish and properly dispose of the concrete slab under the existing stairway to the limits shown on the Drawings. The Contractor shall be paid based on the percentage completed at each application for payment.

Item 2c. Provide Temporary Stairway—This lump sum item shall include, but not be limited to, all labor, materials, and equipment necessary to furnish and install a temporary stairway to provide access to the upper level of the headworks before removal of the existing stairway, and removal and disposal following relocation of the existing stairway. The Contractor shall be paid based on the percentage completed at each application for payment.

Item 3. Pipe, Fittings, and Valves—The Contractor shall furnish all labor, materials, equipment, and services for constructing and placing into operation the force main pipe, fittings, and valves of the sizes and materials shown on the Drawings in accordance with the Contract Documents, including but not limited to all piping, fittings, valves, valve boxes, valve collars, valve stem extensions, restraint, thrust blocks, anchors, supports, concrete encasement, tracing wire, flushing of all lines, connections, protecting existing utilities, excavation, removal of unsuitable materials and replacement with suitable materials, dewatering, backfill, compaction, asphalt removal and replacement, testing, and all associated appurtenances. The Contractor will be paid for each linear foot of pipe installed as measured along the horizontal projection of the center line of the pipe with no deduction in length made for the space occupied by valves or fittings, each fitting installed, and each valve installed, complete and ready for service. The Contractor will be paid for each fitting and valve installed, complete and ready for service.

Item 4. Structural

Item 4a. Stairway Slab—This lump sum item shall include, but not be limited to, all labor, materials, and equipment necessary to furnish and install the slab under the relocated stairway, including formwork, concrete, reinforcing bars, finishing, and curing. The Contractor shall be paid based on the percentage completed at each application for payment.

Item 4b. Pipe Support Slab—This lump sum item shall include, but not be limited to, all labor, materials, and equipment necessary to furnish and install the slab around the vertical force main at the headworks structure, including formwork, concrete, reinforcing bars, finishing, and curing. The Contractor shall be paid based on the percentage completed at each application for payment.

Item 4c. Stairway Landing—This lump sum item shall include, but not be limited to, all labor, materials, and equipment necessary to furnish and install the upper level stairway landing and support structure, including structural members, bolts, nuts, washers, anchors, handrails, kick plates, and appurtenances. The Contractor shall be paid based on the percentage completed at each application for payment.

Item 4d. Relocate Stairway—This lump sum item shall include, but not be limited to, all labor, materials, and equipment necessary to relocate the stairway removed and protected in Item 3a, including structural members, bolts, nuts, washers, anchors, handrails, kick plates, and appurtenances. The Contractor shall be paid based on the percentage completed at each application for payment.

Item 4e. Sidewalk—This lump sum item shall include, but not be limited to, all labor, materials, and equipment necessary to furnish and install sidewalk as shown on the Drawings, including formwork, concrete, reinforcing, expansion joints, open joints, sawcut joints, finishing, and curing. The Contractor shall be paid based on the percentage completed at each application for payment.

Item 4f. Pipe Support—This item shall include, but not be limited to, all labor, materials, and equipment necessary to furnish and install each pipe support for the force main at the headworks structure, as shown on the Drawings. The Contractor will be paid for each pipe support installed, complete and ready for service.

Item 5. Owner's Allowance—The Owner's Allowance shall be as indicated. Payment shall be made to the Contractor, at the sole discretion of the Owner, for additional Work requested by the Owner that is not covered by the Scope of Work identified in this Contract. The Owner's Allowance will be used only with the prior written approval of the Owner. A Scope Description and Fee Breakdown shall be provided to the Owner for any proposed use of the Owner's Allowance.

END OF SECTION

SECTION 01290
SCHEDULE OF VALUES

PART 1 GENERAL

1.01 SCOPE OF WORK (NOT USED)

1.02 RELATED WORK

A. The Owner's Contract Documents.

1.03 SUBMITTALS

The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance:

A. To the Engineer, a proposed Schedule of Values allocated to the various portions of the Work, in accordance with Section 01000, Project Requirements, and Section 01200, Measurement and Payment.

B. Upon request of the Engineer, supporting data that will substantiate the values' correctness.

C. The accepted Schedule of Values shall be used only as the basis for the Contractor's Applications for Payment.

D. An update and resubmittal of the Schedule of Values when Change Orders affect the listing or when the actual performance of the Work involves necessary changes of substance to values previously listed and approved.

E. Schedule of Values:

1. Submit typed schedule on EJCDC 1910-8-E forms provided by the Engineer. The Contractor's standard form or electronic media printout will be considered.
2. Submit Schedule of Values in duplicate within 10 days after the date of Owner-Contractor Agreement.
3. Format – Use the schedule of prices in the Bid Proposal. Show the cost breakdown for each lump-sum item. The lump-sum breakdown shall, at a minimum, use the Table of Contents of this manual outline. Identify each line item with the number and title of the major Specification Section. Identify site mobilization and demobilization, bonds and insurance,

Record Drawings, photographs, and operations and maintenance manuals, etc.

4. For unit cost allowances, identify quantities taken from the Contract Documents multiplied by the unit cost to achieve the total for the item.
5. Include within each line item a direct proportional amount of the Contractor's overhead and profit.
6. Revise the schedule to list approved Change Orders with each Application for Payment.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS (NOT USED)

1.06 QUALITY ASSURANCE (NOT USED)

1.07 WARRANTIES

A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, for storing and protecting the items specified in this Section.

1.09 QUALIFICATIONS (NOT USED)

1.10 CASH ALLOWANCES (NOT USED)

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01300
CONTRACT ADMINISTRATION

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section sets forth some of the general project requirements.

1.02 RELATED WORK

A. Section 01330, Submittals and Acceptance.
B. Section 01785, Record Documents.

1.03 SUBMITTALS

A. Before commencing work, the Contractor shall submit a preliminary progress schedule to the Engineer for review and approval.

B. The Contractor shall furnish the Engineer with revised progress schedules with each Application for Payment in addition to the number required by the Owner.

C. The Contractor shall furnish the Engineer with required photographs to accompany each Application for Payment.

D. The Contractor shall furnish the Engineer with three copies of the Application for Payment.

E. The Contractor shall submit record documents at each progress meeting in accordance with Section 01785, Record Documents.

F. At Contract closeout, the Contractor shall transmit Record Documents and samples with cover letter to the Engineer listing the following:

1. Date.
2. Project title and number.
3. Contractor's name, address, and telephone number.
4. Number and title of each Record Document.
5. Signature of Contractor or authorized representative.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS (NOT USED)

1.06 QUALITY ASSURANCE (NOT USED)

1.07 WARRANTIES

A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, for storing and protecting the items specified in this Section.

1.09 QUALIFICATIONS (NOT USED)

1.10 FORMAT

A. The Contractor shall prepare schedules as a time scale logic diagram and bar chart unless otherwise approved by the Engineer. Each major and minor portion of work or operation shall be clearly identified and tied by logical sequence to the shop drawing schedule and schedule of values. All schedules shall be prepared and submitted on 11-inch-by-17-inch paper.

1.11 SCHEDULE CONTENT

A. The Contractor shall show the complete sequence of construction by activity, with dates for beginning and completion of each element of construction and provide sub-schedules to define critical portions of the entire schedule. Schedules shall also show accumulated percentage of completion of each item and total percentage of work completed as of the first day of each month.

1.12 REVISIONS TO SCHEDULES

A. The Contractor shall indicate the progress of each activity to the date of submittal and the projected completion date of each activity. Revised schedules shall identify activities modified since previous submittal, major changes in scope, and other identifiable changes. The Contractor shall also provide a narrative report to define problem areas, anticipated delays, and impact on schedule. The Contractor shall also report corrective action taken or proposed and its effect, including the effect of schedule changes on other contractors.

1.13 PROGRESS MEETINGS

A. The Owner and Engineer will organize and conduct progress meeting at least once a month to discuss the progress of the Work. The Contractor and any subcontractors the Contractor deems necessary shall attend these meetings. At the Engineer's discretion, the frequency of the meetings may be increased if the progress of the Work is not satisfactory or if coordination problems should arise.

1.14 RECORD DOCUMENTS

A. The Contractor shall adhere to the requirements specified in Section 01785, Record Documents.

1.15 REQUIRED PHOTOGRAPHS

A. The Contractor shall adhere to the requirements specified in Section 01325, Construction Photographs.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01310
CONSTRUCTION COORDINATION

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall coordinate Work with that of other construction projects as needed.

B. Before starting Work and from time to time as the Work progresses, the Contractor and each subcontractor shall examine the work and materials installed by others as it applies to its own work and shall notify the Engineer immediately in writing if any conditions exist which will prevent satisfactory results in the installation of the system. Should the Contractor or subcontractor start work without such notification, it shall be construed as an acceptance of all claims or questions as to the suitability of the work of others to receive its Work. The Contractor shall remove and/or replace, at its own expense, all work under this Contract which may have to be removed on account of such defects or omissions.

1.02 RELATED WORK

A. Section 01000, Project Requirements.
B. Section 01300, Contract Administration.
C. Section 01770, Project Closeout.

1.03 SUBMITTALS

The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance:

A. The Contractor shall ensure that all drawing, product data, and samples comply with Contract Documents and field dimensions and clearances.

B. The Contractor shall submit requests for interpretation of Contract Documents in a timely fashion to ensure there are no disruptions with the Work as scheduled. Obtain instructions through the Engineer to resolve all queries.

C. Process requests for substitutions and Change Orders through the Engineer.

D. Deliver close-out submittals to the Engineer.

1.04 WORK SEQUENCE

A. The Contractor shall submit a preliminary Progress Schedule to the Engineer. After review the Contractor shall revise and resubmit the Progress Schedule to comply with requested revisions.

1.05 REFERENCE STANDARDS (NOT USED)

1.06 QUALITY ASSURANCE (NOT USED)

1.07 WARRANTIES

A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, for storing and protecting the items specified in this Section.

1.09 QUALIFICATIONS (NOT USED)

1.10 CONSTRUCTION MOBILIZATION

The Contractor shall do the following:

A. Cooperate with the Owner in allocating mobilization areas on site for field offices and sheds, access, traffic, and parking facilities.

B. Comply with the Engineer's procedures for intra-project communications: submittals, reports and records, schedules, coordination drawings, recommendations, and resolution of ambiguities/conflicts.

C. Comply with the Engineer’s instructions for use of temporary utilities and construction facilities.

D. Coordinate field engineering and layout work under instructions of the Engineer.

E. Coordinate scheduling, submittals, and work of the various sections of Contract Documents to ensure the efficient and orderly sequence of installation of construction elements, with provisions for accommodating items to be installed later.

F. Coordinate the sequence of Work to accommodate the Owner occupancy as specified in the Contract Documents.

G. In addition to Progress Meetings specified in Section 01300, Contract Administration, hold pre-construction conferences with personnel and Subcontractors to ensure coordination of Work. The Engineer shall be informed of such meetings and shall be allowed to attend.

H. Coordinate the Work of various sections having interdependent responsibilities for installing equipment, connecting equipment, and placing such equipment in service.

I. Coordinate the use of project space and the sequence of installing civil, architectural, mechanical, structural, instrumentation, systems, and electrical work. Follow practicable routings for pipes, ducts, and conduits, with due allowance for available physical space; make runs parallel with lines of building. Use space efficiently to maximize accessibility for other installations, maintenance, and repairs.

J. Coordinate Work at existing facilities to minimize disruption of the Owner's operations.

K. Assemble and coordinate close-out submittals specified in Section 01770, Project Closeout.

1.11 COORDINATION DRAWINGS

A. The Contractor shall provide information required by the Engineer for preparing coordination drawings.

B. The Contractor shall review drawings before submitting them to the Engineer.

1.12 CLOSE-OUT PROCEDURES

The Contractor shall do the following:

A. Notify the Owner when Work is considered ready for Substantial Completion.

B. Comply with the Owner's instructions to correct items of Work listed in executed Certificates of Substantial Completion.

C. Notify the Owner when Work has reached Final Completion.

D. Comply with the Owner's instructions for completing items of Work found incomplete in the Engineer's final inspection.

E. Comply with Section 01770, Project Closeout.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

A. All vehicles on the property must be operational.

3.02 UTILITIES

A. The Contractor shall coordinate the activities of all utility companies with equipment in the construction area with the Contractor’s and Subcontractor’s Work.

3.03 CUTTING AND PATCHING

A. No cutting and patching of new Work will be accepted. All Work must be new and continuous in its final form.

END OF SECTION

SECTION 01325
CONSTRUCTION PHOTOGRAPHS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall have digital pictures, photographs, and DVDs made of the Work from views and at such times as directed by the Engineer. These photographs and videos shall represent a visual history of the Project, from Contract Award through Contract Completion.

B. The Contractor shall take a preconstruction video of the entire site, including the areas of adjacent properties within 100 feet of the limit of Work. Special effort shall be made to show the existing paved roads, shoulders, signs, and other existing features.

C. The Contractor shall also use electronic "snap-shot" photography as necessary to record and facilitate resolution of on-site issues through the transmission of electronic photographs by e-mail from the site to the Engineer's and Owner's offices.

1.02 RELATED WORK

A. Section 01000, Project Requirements.
B. Section 01785, Record Documents.

1.03 SUBMITTALS (NOT USED)

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS (NOT USED)

1.06 QUALITY ASSURANCE (NOT USED)

1.07 WARRANTIES

A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, for storing and protecting the items specified in this Section.

1.09 QUALIFICATIONS (NOT USED)

PART 2 PRODUCTS

2.01 PRODUCTS

A. Digital pictures shall be in color. Provide one copy of each digital picture on each of three CDs.

B. Provide photographs taken of each of the major items during construction.

C. View and Quantities Required: A minimum of 30 digital pictures per month clearly showing project status and key elements of construction.

D. Deliver electronic images to the Engineer with every pay request.

E. All digital pictures shall be clear, sharp, free of distortion, and shall have the date and time the photo was taken imprinted on the photo.

PART 3 EXECUTION

3.01 VIEWS REQUIRED

A. Photographs shall be from locations to illustrate the condition of construction and the state of progress adequately.

B. The Contractor shall provide before and after photographs of each portion of the site. The below-ground facilities shall include all equipment, walls, floor, piping, supports, and entrance. At major locations, photographs shall include before, during, and after views to show the Work as it progresses.

3.02 DESCRIPTIVE INFORMATION

A. Each CD shall be clearly labeled with the following:

COMPLETE PROJECT NAME
Contract No.
CONTRACTOR: (Name of Contractor)

B. Each photograph shall have the following information. Information shall be on the photo and maintained in a photo log as required by the Owner.

DATE AND TIME:	(When photo was taken)
PHOTO NO.:	(Consecutive Numbers)
PHOTO BY:	(Firm Name of Photographer)
LOCATION:	(Description of Location and View)

C. The Contractor shall provide the Engineer with a written description of each photograph. This description shall be submitted with the CDs. The Field Engineer or inspector shall approve the description.

3.03 VIDEOTAPE REQUIREMENTS

A. Major Locations:

1. The Contractor shall provide color digital video of each major facility, and structures and facilities adjacent to the construction before construction starts and when construction has been completed.
2. All videos shall be recorded with character generator operating with date, time, and location on screen. During video recording, the Contractor shall narrate the video, explaining what is being shown, the problem that has occurred, and what is being done. All videos shall be delivered to the Engineer within 10 days after production.

END OF SECTION

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SECTION 01330
SUBMITTALS AND ACCEPTANCE

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall submit documentation that describes the Work to be performed under the Contract as required in this Section. This documentation will be for the Engineer and Owner's review and use. The documentation furnished by the Contractor must enable the Engineer and Owner to verify the Contractor's performance and compliance with Contract requirements. The documentation shall cover all services and deliverables required and secured by the Contract Documents.

1.02 RELATED WORK

A. The Contractor shall prepare documentation and submittals required by other sections of the Contract. The format of documents and submittals required by other sections shall conform to the requirements of this Section.

1. The Owner's Contract Documents.
2. Section 01785, Record Documents.
3. All Sections and Divisions that require submittal of documents.

1.03 SUBMITTALS

A. General—The Contractor shall submit the following:

1. Project documentation: For the Engineer and Owner's internal use and shall include all information that will be essential for the facility's operations, maintenance, training, and repair of equipment and facilities supplied by the Contractor. The Contractor shall submit all documentation necessary to ascertain compliance with technical/contractual provisions.
2. Shop drawings: Drawings, schedules, diagrams, warranty, and other data prepared specifically for this Contract by the Contractor or through the Contractor by way of subcontractor, manufacturer, supplier, distributor, or other lower-tier contractor to illustrate a portion of the Work.
3. Product data: Preprinted materials such as illustrations, standard schedules, performance charts, instructions, brochures, diagrams, manufacturer's descriptive literature, catalog data, and other data to illustrate a portion of the Work, but not prepared exclusively for this Contract.

4. Administrative submittals: Data presented for reviews and acceptance to ensure that administrative requirements of the project are adequately met but not to ensure directly that work is in accordance with the design concept and in compliance with Contract Documents.

B. Coordination

1. Submittals and schedules shall be checked and coordinated with the Work of all trades involved before they are submitted and shall bear the Contractor's stamp of approval as evidence of such checking and coordination. Drawings or schedules submitted without this stamp of approval shall be returned to the Contractor for resubmission.

C. Start of Work

1. Within 10 calendar days after the notice to proceed for the project, the Contractor shall submit to the Engineer a Contract Data Requirements List that defines all data to be submitted under this Contract. Included in this list shall be the names of all proposed manufacturers furnishing specified items to the extent known. Review of this list by the Engineer shall in no way relieve the Contractor from providing materials, equipment, systems, and structures fully in accordance with the Specifications.

D. General Requirements

1. The Contractor shall prepare, assemble, and submit all documents as described herein. The Contractor shall submit certification that the documents prepared conform to the Contract requirements and will result in a complete and operable project. The Engineer shall review the Contractor’s documents for conformance to the Contract requirements and may comment on the documents.
2. The Contractor shall approve and certify all project documents. The Contractor’s failure to certify the documents or failure to provide documents that demonstrate conformance to the Contract requirements are grounds for rejection. The Contractor shall be responsible for and bear all costs for proceeding with any part of the Work that fails to meet the Contract requirements.
3. Submittal of documents for the Engineer’s review shall in no way relieve the Contractor of full responsibility for providing a complete, safe, reliable, operating, and coordinated Work (system/equipment/facilities) that is in compliance with these Contract documents.

E. Requests for Substitution

1. All requests for substitution shall clearly and specifically indicate any and all differences or omissions between the products specified as basis of design and the product proposed for substitution. Data shall include but not be limited to differences as follows for both the specified and substituted products:

   a. Principle of operation.
   b. Materials of construction or finishes.
   c. Thickness or gauge of materials.
   d. Weight of item.
   e. Deleted features or items.
   f. Added features or items.
   g. Changes in other work caused by the substitution.
   h. If the substitution contains differences or omissions not specifically called to the attention of the Engineer, the Engineer reserves the right to require equal or similar features to be added to the substituted product at the Contractor's expense.

F. Submittal Requirements and Procedures

1. Drawing Formats and Requirements

   a. Drawings—All Drawings and Shop Drawings shall be prepared on appropriate sized paper and shall have a blank area of 3 x 4 inches in the lower right hand corner above the title block. Each Drawing shall indicate the following information in the title block:

      (1) Title and Drawing Number.
      (2) Date of Drawing or Revision.
      (3) Name of Building or Facility.
      (4) Name of Contractor or subcontractor.
      (5) Drawing contents and locations.
      (6) Specification Section and Subsection Numbers.

   b. Required Copies—Unless submitted electronically, all drawings submitted shall have a minimum of six copies distributed in the following way:

      (1) 2—Owner – 1 for the Owner project file and 1 with comments for Jones Edmunds to be incorporated into Jones Edmunds review and comments to the Contractor.

(2) 4—Jones Edmunds – 1 to file, 1 to the Owner for their file with all comments, 2 with the Owner and Engineer comments returned to the Contractor.

(3) 2—Returned – Compiled with the City and Engineer comments and corrections to the Contractor.

2. Product Data

a. Requirements—Product data shall include all catalog cuts, performance surveys, test reports, equipment lists, material lists, diagrams, pictures, and descriptive material. All product data shall be submitted on either 8.5-x-11-inch or folded 11-x-17-inch size paper of 20-pound (9.072 kg) weight. The submittal information shall show the standard and optional product features, as well as all performance data and specifications. The manufacturer’s recommendation for special tools shall be supplied.

3. Submittal Information Requirements

a. When used in the Contract Documents, the term "Submittal Information" shall be considered to mean the following information at a minimum:

(1) Contract Name.
(2) Contract Number.
(3) Location within Facility.
(4) Date Submitted.

b. Drawings—The Contractor shall mark submittal information on all Drawings in the left half of the 4-x-3-inch block as described above.

c. Product Data and Manufacturer's Literature:

The Contractor shall mark all product data and manufacturer's literature with submittal information and note which item is being furnished. The Contractor shall mark the option and supplies to be furnished with the item. At least one original manufacturer product data sheet must be submitted; the balance can be copied. Do not submit the manufacturer's general catalog: submit only items being installed or delivered. When manuals are being submitted, the Contractor shall mark submittal information on both the cover and title page. If manuals being submitted contain more than just one

item, each item must be marked and only Contract name and number is to be marked on the cover and title page.

4. Training, Operation and Maintenance Manuals (NOT USED)

G. Required Submittals

1. Architectural and Structural Submittals

a. This Section specifies general procedural requirements for contractual submittals for the following architectural and structural schedules, product data, samples, and manufacturer's certificates.

(1) Product Data—The Contractor shall provide product data for all architectural and structural items, options, and other data and provide supplemental manufacturer's standard data for information unique to the Work and installation. The submittals shall reflect all items delivered or installed under this Contract.
(2) Material, equipment, and installation and demolition Specifications.
(3) Calculations to demonstrate compliance with applicable codes. Calculations shall be signed and sealed by an engineer licensed in the State of Florida.

2. Mechanical and Electrical System Submittals

a. This Section specifies general procedural requirements for mechanical schedules, performance data, control diagrams, and other submittal data.

b. The Contractor shall submit the following:

(1) Performance Data.
(2) Finished Data—Complete surface preparation and finished data for all mechanical and electrical unit/subsystems shall be provided, including a complete list of cleaning instructions.
(3) Factory Testing—Detailed description of factory testing procedures, reporting procedures and criteria for test passing or failing shall be provided for all mechanical and electrical units/subsystems. Testing shall comply with the General Requirements and Technical Requirements Sections.

(4) Site (Field) Testing and Acceptance—Detailed description of site testing and acceptance tests including descriptions of procedures, testing equipment, reporting procedures, and criteria for passing or failing tests shall be provided for all mechanical and electrical units/subsystems. Testing shall comply with General Requirements and Technical Requirements.

(5) Factory Test Report—After fabrication and testing, the Contractor shall submit the results of tests. No shipment of any mechanical and electrical unit/subsystem shall be allowed without the written certification from the Contractor that the equipment conforms to the Contract requirements.

(6) Site Test and Acceptance Report—Site test and acceptance reports shall be submitted to the Owner and Engineer.

H. Submittal Review

1. The Engineer's review of the Contractor's documents shall not relieve the Contractor of the responsibility for meeting all of the requirements of the Contract nor of the responsibility for correcting the documents furnished. The Contractor shall have no claim for additional cost or extension in time because of delays due to revisions of the documents that may be necessary for ensuring compliance with the Contract.

2. The Engineer will review a submittal or re-submittal once, after which the cost of review shall be borne by the Contractor. The cost of engineering shall be equal to the Engineer's full cost.

3. No partial submittals will be reviewed. A submittal or re-submittal not complete will be returned to the Contractor for completing and re-submittal.

4. Documents submitted by the Contractor for approval by the Engineer will be returned bearing a project-specific stamp bearing the dated signature of the reviewer and one of four boxes checked:

a. NO EXCEPTIONS NOTED—This indicates that the submittal appears to be in compliance with the requirements of the performance specifications and that the Work may proceed.

b. MAKE CORRECTIONS NOTED—This indicates that the reviewer has added a minor correction to the submission and that the Work (modified in accordance with the correction comment) may proceed.

The Contractor shall accept the responsibility of the modified document and resulting Work with no additional compensation.

c. AMEND AND RESUBMIT—This indicates that the submittal will require Contractor modifications based on the reviewer's comments that accompanied the returned submittal. The Contractor will be cautioned that work may not proceed under this review status.

d. REJECTED—This indicates that the submittal is not in conformance with the requirements of the performance Specifications and cannot be modified to gain compliance. A new submittal will be required in the instance of a "reject" status and the Contractor will be cautioned that work may not proceed under this condition.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS (NOT USED)

1.06 QUALITY ASSURANCE (NOT USED)

1.07 WARRANTIES

A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, for storing and protecting the items specified in this Section.

1.09 QUALIFICATIONS (NOT USED)

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 SUBMITTAL PROCEDURES

A. Before submitting documents for the Engineer's review, the Contractor shall review the documentation for conformance to the Contract requirements. Submittals shall be complete and comprise a logical division of the Contract Work.

B. All documentation submitted by the Contractor to the Engineer shall be accompanied by a letter of transmittal and shall be submitted in a sequence that

allows the Engineer to have all of the information necessary for checking and accepting a particular document at the time of submittal.

C. Each document shall be identified by a document number, Contract number, Contract name, location, Specification Section, Subsection numbers, and submittal date. Where a manual/drawing is revised to reflect a change in design or a change for any other reason, each such revision shall be shown by a revision number, date, and subject in a revision block. Indication of official approval by the Contractor's Project Manager shall also be included. To permit rapid location of the revision, additional notation shall be made in the manual opposite the line or area where the change was made and identified by the corresponding revision number.

3.02 DOCUMENTATION CONTROL AND SUBMITTAL SEQUENCING

A. The Contract Data Requirements List shall be updated and resubmitted to the Engineer monthly, throughout the duration of the Contract. This list shall identify the Contractor’s submittal number, proposed and actual submittal date, Contract Specification Section Number, Paragraph, Item of the Work, and type of document.

B. The Contractor shall work with the Engineer to provide a regulated flow of submittals that allows the Engineer to review the submittals in the defined time frame without undue delays. Monthly the Contractor shall provide the Engineer a schedule of the approximate quantities and delivery dates for all submittals due for the next 120 days.

3.03 FINAL RECORD DRAWINGS

A. The Contractor shall submit the Final Record Drawing Package to the Engineer for review 60 days before Final Completion. The Contractor shall adhere to the requirements specified in Section 01785, Record Documents.

3.04 REQUIREMENTS FOR SUBMITTAL

A. Additional documents, drawings, interface data, and other pertinent project submittal data are listed in specific sections of this Contract.

3.05 RECORD PRINTS

A. The Contractor shall submit one set of all record prints before final completion. The record print or project records shall include submittals, catalog cuts, drawings, calculations, test reports, manufacturer's data, maintenance manuals, installation instructions, and operating manuals. All "record prints" shall be delivered to the Engineer in three-ring binders with dividers and shall be placed in order by Specification Section.

END OF SECTION

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SECTION 01350
ENVIRONMENTAL PROTECTION PROCEDURES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Work covered by this Section consists of furnishing all labor, materials, and equipment and performing all work required for the prevention of environmental pollution in conformance with applicable laws and regulations during and as the result of construction operations under this Contract. In this Section *environmental pollution* is defined as the presence of chemical, physical, or biological elements or agents that adversely affect human health or welfare, unfavorably alter ecological balances of importance to human life, affect other species of importance to man, or degrade the utility of the environment for aesthetic and/or recreational purposes.

B. The control of environmental pollution requires considering air, water, and land and involves managing noise and solid waste as well as other pollutants.

C. The Contractor shall schedule and conduct all work in a manner that will minimize the erosion of soils in the area of the Work. The Contractor shall provide erosion-control measures such as diversion channels, sedimentation or filtration systems, berms, staked hay bales, seeding, mulching or other special surface treatments that are required to prevent silting and muddying of streams, rivers, impoundments, lakes, etc. All erosion-control measures shall be in place in an area before any construction activity in that area. Specific requirements for erosion and sedimentation controls are specified in Section 02370, Erosion and Sedimentation Control.

D. This Section is intended to ensure that construction is achieved with a minimum of disturbance to the existing ecological balance between a water resource and its surroundings. These are general guidelines. It is the Contractor's responsibility to determine the specific construction techniques to meet these guidelines.

E. All phases of sedimentation and erosion control shall comply with and be subject to the laws of the State of Florida and the Project Environmental Resource Permit.

1.02 RELATED WORK

A. Section 01100, Summary of Work.
B. Section 02370, Erosion and Sedimentation Control.

1.03 SUBMITTALS

A. The Contractor shall prepare a sedimentation and erosion-control drawing meeting the requirements of the law and furnish two copies of the approved Drawing to the Engineer.

1.04 WORK SEQUENCE

A. Before beginning the Work, the Contractor shall meet with the Engineer to establish agreed-upon compliance with these provisions and administration of the environmental pollution control program.

B. The Contractor shall remove temporary environmental control features when approved by the Engineer and incorporate permanent control features into the project at the earliest practicable time.

1.05 REFERENCE STANDARDS

A. Reference standards and recommended practices referred to in this Section shall be the latest revision of any such document in effect at the bid time. Where this Section differs from these documents, the requirements of this Section shall apply.

B. The Contractor shall comply with all applicable federal, state, and local laws and regulations concerning environmental pollution control and abatement.

1.06 QUALITY ASSURANCE (NOT USED)

1.07 WARRANTIES

A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, for storing and protecting the items specified in this Section.

1.09 QUALIFICATIONS (NOT USED)

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 EROSION CONTROL

A. The Contractor shall provide positive means of erosion control such as shallow ditches around construction to carry off surface water. Erosion-control measures, such as siltation basins, hay check dams, mulching, jute netting, and other equivalent techniques shall be used as appropriate. Surface water shall be prevented from flowing into excavated areas. Ditches shall be used around the construction area to carry away water resulting from dewatering excavated areas. At the completion of the Work, ditches shall be backfilled and the ground surface restored to its original condition.

3.02 PROTECTION OF STREAMS AND SURFACE WATERS

A. Care shall be taken to prevent or reduce to a minimum any damage to any stream or surface water from pollution by debris, sediment, or other material or from the manipulation of equipment and/or materials in or near such streams. Water that has been used for washing or processing or that contains oils or sediments that will reduce the quality of the water in the stream shall not be directly returned to the stream. Such waters shall be diverted through a settling basin or filter before being directed into streams or surface waters.

B. The Contractor shall not discharge water from dewatering operations directly into any live or intermittent stream, channel, wetlands, surface water, or any storm sewer. Water from dewatering operations shall be treated by filtration, settling basins, or other approved method to reduce the amount of sediment contained in the water to allowable levels.

C. All preventative measures shall be taken to avoid spillage of petroleum products and other pollutants. In the event of any spillage, prompt remedial action shall be taken in accordance with a contingency action plan approved by the Florida Department of Environmental Protection and the US Environmental Protection Agency. The Contractor shall submit two copies of approved contingency plans to the Engineer.

D. Chlorinated water being flushed from structures or pipelines shall be disposed of in accordance with all State, Local, and Federal laws and requirements.

3.03 PROTECTION OF LAND RESOURCES

A. After completion of construction, the Contractor shall restore land resources within the project boundaries and outside the limits of permanent work to a condition that will appear to be natural and not detract from the appearance of the

project. All construction activities shall be confined to areas shown on the Drawings.

B. Any trees or other landscape features scarred or damaged by the Contractor's equipment or operations shall be restored as nearly as possible to their original condition. The Owner will decide the method of restoration to be used and whether damaged trees shall be treated and healed or removed and disposed of.

C. The Contractor’s storage and other construction buildings required temporarily in the performance of the work shall be located in cleared portions of the job site or areas to be cleared as shown on the Drawings and approved by the Engineer and shall not be within wetlands or floodplains. Preserving the landscape shall be required in the selection of all sites and in the construction of buildings. Drawings showing storage facilities shall be submitted for the Engineer’s approval.

D. All debris and excess material will be disposed of outside wetland or floodplain areas in an environmentally sound manner in accordance with permits as well as Local, State, and Federal laws and requirements.

3.04 PROTECTION OF AIR QUALITY

A. Burning—Burning will not be permitted at the project site for the disposal of refuse and debris.

B. Dust Control—The Contractor shall maintain all excavations, embankment, stockpiles, access roads, plant sites, waste areas, borrow areas, and all other work areas within or outside the project boundaries free from dust which could cause the standards for air pollution to be exceeded and which would cause a hazard or nuisance to others.

C. An approved method of stabilization consisting of sprinkling or other similar methods will be permitted to control dust. The use of petroleum products is prohibited. The use of chlorides may be permitted with approval from the Engineer.

D. To be approved, sprinkling must be repeated at such intervals as to keep all parts of the disturbed area at least damp at all times, and the Contractor shall have sufficient competent equipment on the job to accomplish this. Dust control shall be performed as the Work proceeds and whenever a dust nuisance or hazard occurs, as determined by the Owner.

3.05 NOISE CONTROL

A. The Contractor shall make every effort to minimize noises caused by the construction operations. Equipment shall be equipped with silencers or mufflers designed to operate with the least possible noise in compliance with federal and state regulations.

3.06 MAINTENANCE OF POLLUTION-CONTROL FACILITIES DURING CONSTRUCTION

A. During the life of this Contract, the Contractor shall maintain all facilities constructed for pollution control as long as the operations creating the particular pollutant are being carried out or until the material concerned has become stabilized to the extent that pollution is no longer being created.

END OF SECTION

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SECTION 01450
TESTING AND TESTING LABORATORY SERVICES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor will pay for the costs of all laboratory tests required to determine soil density and concrete compressive strength. The cost of all testing shall be included in the cost of the item for which testing is required. All required testing shall be coordinated with and scheduled by the Contractor.

1. The Contractor shall cooperate with the laboratory to facilitate the execution of required services.
2. Employment of a testing laboratory shall in no way relieve the Contractor of the obligation to perform work in accordance with the requirements of the Contract Documents.

1.02 RELATED WORK

A. Conditions of the Contract: Inspections and testing required by laws, ordinances, rules, regulations, orders, or approvals of public authorities.

B. Respective Sections: Certification of products.

C. Each Section listed: Laboratory tests required and standards for testing.

D. Testing Laboratory inspection, sampling, and testing are required for but are not limited to the following:

1. Section 02300, Earthwork for Structures.
2. Section 02305, Earthwork for Utilities.
3. Section 15055, Piping Systems—General.
4. Section 15144, Pressure Testing of Piping.

1.03 SUBMITTALS

A. The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance.

B. Submit to the Engineer for review a list and schedule of all tests to be conducted.

C. Describe test procedures along with duration of tests.

D. After each inspection and test, the Laboratory shall promptly submit two copies of the laboratory report to the Engineer, one copy to the Contractor, and one copy to the Owner.

E. Include the following:

1. Date issued.
2. Project title and number.
3. Name of field testing technician or inspector.
4. Date and time of sampling or inspection.
5. Identification of product and Specifications Section.
6. Location in the Project.
7. Type of inspection or test.
8. Date of test.
9. Results of test.
10. Conformance with Contract Documents.

F. When requested by the Engineer, provide interpretation of test results.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to in this Section shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

A. American Society for Testing and Materials (ASTM)

1. ASTM E329—Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.
2. ASTM D3740—Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

1.06 QUALITY ASSURANCE

A. The Laboratory is not authorized to do any of the following:

1. Release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Approve or accept any portion of the work.
3. Perform any duties of the Engineer of Record or the Engineer.

B. The Contractor shall be responsible for the following:

1. Cooperating with laboratory personnel, providing access to work and to manufacturer's operations.

2. Securing and delivering to the laboratory adequate quantities of representative samples of materials proposed to be used and which require testing.

3. Providing to the laboratory the preliminary design mix proposed to be used for concrete and other materials mixes that require control by the testing laboratory.

4. Furnishing incidental labor and facilities:

   a. To provide access to work to be tested.
   b. To obtain and handle samples at the project site or at the source of the product to be tested.
   c. To facilitate inspections and tests.
   d. To store and cure test samples.

5. Notifying the Engineer and laboratory sufficiently in advance of operations to allow the laboratory to assign personnel and schedule tests.

6. Employing and paying for the services of the same or a separate, equally qualified independent testing laboratory to perform additional inspections, sampling, and testing required for the Equipment Supplier or Contractor's (as applicable) convenience.

C. Materials and equipment used in the performance of Work under this Contract are subject to inspection and testing at the point of manufacture or fabrication. Standard requirements for quality and workmanship are indicated in the Contract Documents. The Engineer may require the equipment supplier or Contractor (as applicable) to provide statements or certificates from the manufacturers and fabricators that the materials and equipment provided by them are manufactured or fabricated in full accordance with the standard specifications for quality and workmanship indicated in the Contract Documents. All costs of this testing and providing statements and certificates shall be a subsidiary obligation of the Contractor, and no extra charge to the Owner shall be allowed on account of such testing and certification.

D. If the test and any subsequent retest results indicate that the materials or equipment fail to meet the requirements of the Contract Documents, the

equipment supplier or Contractor (as applicable) shall pay for the laboratory costs directly to the testing firm and these will not be reimbursable to the equipment supplier or Contractor (as applicable).

1.07 WARRANTIES

A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, for storing and protecting the items specified in this Section.

1.09 QUALIFICATIONS

A. Comply with requirements of ASTM E329 and ASTM D3740.

B. Laboratory: Licensed to operate in Florida.

C. Laboratory Staff: Maintain a full-time Professional Engineer registered in Florida on staff to review the services performed under this project.

D. Testing Equipment: Calibrated at reasonable intervals with devices of accuracy traceable to either National Bureau of Standards (NBS) or accepted values of natural physical constants.

E. Provide qualified personnel at the site. Cooperate with the Engineer and Contractor in performing services.

F. Perform specified inspection, sampling, and testing of products in accordance with specified standards.

G. Ascertain compliance of materials and mixes with requirements of Contract Documents.

H. Promptly notify the Engineer and Contractor of observed irregularities or non-conformance of Work or Products.

I. Perform additional inspections and tests required by Engineer.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01500
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SCOPE OF WORK (NOT USED)

1.02 RELATED WORK (NOT USED)

1.03 SUBMITTALS (NOT USED)

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS (NOT USED)

1.06 QUALITY ASSURANCE (NOT USED)

1.07 WARRANTIES

A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, for storing and protecting the items specified in this Section.

1.09 QUALIFICATIONS (NOT USED)

1.10 RESPONSIBILITY

A. This Section specifies the minimum requirements for temporary facilities, utilities, and controls required to provide an adequate and safe work site at every stage during construction of the Project. The Contractor is solely responsible for the requirements set forth in this Section.

1.11 ONSITE TEMPORARY

A. Except as otherwise indicated, the Contractor may, at his option, furnish stand-alone utility plants to provide needed services in lieu of connected services from available public utilities, provided such stand-alone plant facilities comply with all governing regulations. Before availability of temporary utility services, the

Contractor will provide trucked-in/trucked-out containerized or unitized services for start-up of construction operations at the site.

1.12 COSTS

A. Except as otherwise indicated, the costs of providing and using temporary utility services are included in the contract sum.

1.13 TEMPORARY FACILITIES

A. The types of utility services required for temporary use at the project site include the following (other specific services may be required for specific construction methods of operations):

1. Electrical Power Service.
2. Water Service (potable for certain uses).
3. Sanitary.
4. Storm Sewer or Open Drainage/Run-off Control.
5. Gas (fuel) Service.

1.14 TEMPORARY ELECTRICITY

A. The Contractor shall make the necessary applications and arrangements and pay all fees and charges for electrical energy for power and light necessary for proper completion of the Work and during its entire progress up to time of final acceptance by the Owner. The Contractor shall provide and pay for all temporary switches, connections, and meters.

1.15 TEMPORARY WATER

A. The Contractor shall make all necessary application and arrangements and pay all fees and charges for water necessary for the proper completion of the Project up to the time of final acceptance. The Contractor shall provide and pay for any temporary piping and connections.

1.16 TEMPORARY SANITARY FACILITIES

A. The Contractor shall provide adequate sanitary facilities for the use of those employed on the Work. Such facilities shall be made available when the first employees arrive on the site of the Work, shall be properly secluded from public observation, and shall be constructed and maintained during the progress of the Work in suitable numbers and at such points and in such manner as may be required or approved.

1.17 CLEANLINESS OF FACILITIES

A. The Contractor shall maintain the sanitary facilities in a satisfactory and sanitary condition at all times and shall enforce their use. He shall rigorously prohibit the committing of nuisances on the site of the Work, on the lands of the Owner, or on adjacent property.

1.18 TERMINATION AND REMOVAL

A. At the time the need for a temporary utility service has ended or has been replaced by use of permanent services, or not later than the time of final completion, the Contractor shall promptly remove the installation unless requested by the Engineer to retain it for a longer period. Any work which may have been delayed or affected by the installation and use of the temporary utility, including repairs to construction and grades and restoration and cleaning of exposed surfaces, shall be completed at this time. The Contractor shall replace any work damaged beyond acceptable restoration.

1.19 NOISE CONTROL

A. The Contractor shall provide adequate protection against objectionable noise levels caused by the operation of construction equipment.

1.20 DUST CONTROL

A. The Contractor shall provide for adequate protection against raising objectionable dust clouds caused by moving construction equipment, high winds, or any other cause.

1.21 WATER CONTROL

A. The Contractor shall provide for satisfactory disposal of surplus water and shall submit a plan to the Engineer for review before initiating and implementing the plan. Prior approval shall be obtained from the proper authorities for the use of public or private lands or facilities for such disposal.

1.22 POLLUTION CONTROL

A. The Contractor shall provide for adequate protection against polluting any public or private lands, lakes, ponds, rivers, streams, creeks, and other such areas by the disposal of surplus material in the form of solids, liquids, gases, or from any other cause.

1.23 ADVERSE IMPACT

A. The Contractor shall evaluate and assess the impact of any adverse effects on the natural environment that may result from construction operations and shall operate to minimize pollution of air, ground, or surface waters vegetation, and afford the neighboring community the maximum protection during and up to completion of the construction project.

1.24 STREAMS, LAKES, AND OTHER BODIES OF WATER

A. The Contractor shall take sufficient precautions to prevent pollution of streams, lakes, and reservoirs with fuels, oils, bitumens, calcium chloride, or other harmful materials.

1.25 CHEMICALS

A. All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant, or of other classification, must show approval of either US EPA or USDA. Use of all such chemicals and disposal of residues shall be in strict conformance with instructions.

1.26 EROSION CONTROL

A. The Contractor shall not expose by construction operations a larger area of erosive land at any one time than the minimum necessary for efficient construction operations, and the duration of exposure of the uncompleted construction to the elements shall be as short as practicable. Erosion-control features shall be constructed concurrently with other work and at the earliest practicable time.

1.27 STORAGE FACILITIES

A. All products, materials, and equipment shall be stored in accordance with the manufacturer's instructions, with seals and labels intact and legible. Products subject to damage by the elements shall be stored in weathertight enclosures. Temperature and humidity shall be maintained within the ranges required by the manufacturer's instructions. Fabricated products shall be stored above the ground on blocking or skids. Products which are subject to deterioration shall be covered with impervious coatings with adequate ventilation to avoid condensation. Loose granular materials shall be stored in a well-drained area on solid surfaces to prevent mixing with foreign matter. Any products which will come in contact with water shall be stored off the ground to prevent contamination.

1.28 INSPECTION

A. Storage shall be arranged in such a manner to provide easy access for inspection. Periodic inspections shall be made of all stored products to ensure that they are maintained under specified conditions and free from damage or deterioration.

1.29 TEMPORARY PROTECTION

A. After installation, the Contractor shall provide substantial coverings as necessary to installed products to protect them from damage from traffic and subsequent construction operations. Coverings shall be removed when no longer needed.

1.30 ADJACENT TO WORK

A. The Contractor shall protect from damage all property along the line of the Work or in the vicinity of or in any way affected by the Work, the removal or destruction of which is not called for by the Drawings. Wherever such property is damaged due to the activities of the Contractor, it shall be immediately restored to its original condition or better by the Contractor at no cost to the Owner.

1.31 REMEDY BY OWNER

A. In case of failure on the part of the Contractor to restore such property or make good such damage or injury, the Owner may, after 48 hours' notice to the Contractor, proceed to repair, rebuild, or otherwise restore such property as may be deemed necessary and the cost of such repairs, rebuilding, or restoration will be deducted from any monies due or which may become due to the Contractor under this Contract.

1.32 PROTECTION FROM DAMAGE

A. The Contractor shall be responsible for protecting property in the areas in the vicinity of the Project and for protecting his equipment, supplies, materials, and work against any damage resulting from the elements, such as flooding, rainstorm, wind damage, or other such damage, and shall be responsible for damage resulting from the same. The Contractor shall provide adequate drainage facilities, tie-downs, or other protection throughout the contract period for the protection of his, the Owner's, and other properties from such damage.

1.33 TRAFFIC REGULATION

A. Signs, marking barricades, and procedures shall conform to the requirements of the Florida Department of Transportation Manual on Traffic Controls and Safe

Practices for Street and Highway Construction, Maintenance, and Utility Operations.

B. The Contractor shall maintain access to headworks to allow servicing of dumpsters located under the headworks structure. The dumpsters are serviced on Monday, Wednesday, and Friday.

1.34 BARRICADES

A. The Contractor shall provide and maintain adequate barricades around open excavations.

1.35 SIGNAGE (NOT USED)

1.36 REMOVAL OF SIGNAGE

A. On completion of the Work, the Contractor shall remove all debris, excess materials, barricades, and temporary work, leaving walkways and roads clear of obstructions.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01600
MATERIALS AND EQUIPMENT

PART 1 GENERAL

1.01 SCOPE OF WORK

This Section includes the minimum requirements for the furnished materials and equipment for this project. The more stringent requirements in the Technical Specification Sections shall take precedence over these requirements for any conflicts.

A. Materials and equipment furnished by the Contractor shall be new and shall not have been in service at any other installation unless otherwise approved. They shall conform to applicable specifications approved in writing by the Engineer.

B. Manufactured and fabricated products shall be designed, fabricated, and assembled in accordance with the best engineering and shop practices. Like parts of duplicate units shall be manufactured to standard sizes and gauges so as to be interchangeable.

C. Quantities of items that are identical shall be by the same manufacturer, regardless of the Design Package breakdown.

D. Equipment sizes, capacities, and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.

E. Materials and equipment shall not be used for any purpose other than that for which they are designed or specified.

F. Where materials or equipment are specifically shown or specified to be reused in the Work, special care shall be used in removing, handling, storing, and reinstalling to ensure their proper function in the completed Work.

G. Material and equipment incorporated into the Work:

1. Shall conform to applicable specifications and standards.
2. Shall comply with size, make, type, and quality specified or as specifically approved in writing by the Engineer.

1.02 RELATED WORK

A. Section 01000, Project Requirements.

B. Section 01740, Final Cleaning.
C. Section 01780, Warranties and Bonds.

1.03 SUBMITTALS (NOT USED)

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS (NOT USED)

1.06 QUALITY ASSURANCE (NOT USED)

1.07 WARRANTIES

A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, for storing and protecting the items specified in this Section.

1.09 QUALIFICATIONS (NOT USED)

1.10 ACCEPTANCE OF MATERIAL AND EQUIPMENT

A. Only new materials and equipment shall be incorporated in the Work. All materials and equipment furnished by the Contractor shall be subject to the inspection and acceptance of the Engineer. No material shall be delivered to the site that does not meet the Contract Specifications.

B. The Contractor shall submit data and samples sufficiently early to permit consideration and acceptance before materials are necessary for incorporating in the work. Any delay of acceptance resulting from the Contractor's failure to submit samples or data promptly shall not be used as a basis of claim against the Owner.

C. The materials used in the Work shall correspond to the approved samples or other data.

D. If requested, the Contractor shall be required to submit to the Engineer ample evidence that each and every part of the materials to be furnished is of a reliable make and of a type that has been in successful operation within the continental

United States. The Engineer or Owner will not allow any experimental or untried type of material or machinery to be installed.

E. All materials entering into the Work shall be tested as specified. Unless waived in writing by the Engineer, all field and operating tests shall be made in the presence of the Engineer or the Engineer's authorized representative. When such a waiver is issued, the Contractor or manufacturer shall furnish sworn statements in duplicate of the tests conducted and the results of the tests to the Engineer.

F. The Contractor shall submit copies of welding procedures for all welding. Welders and welding operators shall be selected in accordance with the qualification requirements of the AWS Code. Welders and welding operators for stainless steel shall pass qualification tests using stainless steel filler metal and procedures developed for stainless steel. Procedures, welder, and operator qualifications shall be certified by an independent testing laboratory retained and paid by the Contractor.

G. The Contractor shall not start fabrication of the Work until the Contractor receives written acceptance of the proof of welding procedures from the Engineer for each type of weld.

H. The Contractor shall submit copies of mill certificate for each type of rolled steel and as required in the Specifications. The Contractor shall not start fabrication of the work until the Contractor receives written acceptance of all mill certificates from the Engineer.

1.11 MANUFACTURER'S INSTRUCTIONS FOR INSTALLATION

A. The equipment installation details shall suit the existing and furnished equipment and are subject to acceptance by the Engineer.

B. Any changes or revisions made necessary by the type and dimensions of the equipment furnished shall be made at the expense of the Contractor who shall furnish detailed drawings showing such changes or revision for the acceptance of the Engineer.

C. The installation of all work shall comply with the manufacturer's printed instructions. The Contractor shall obtain and distribute copies of such instructions to parties involved in the installation, including six copies to the Engineer for distribution. One complete set of instructions shall be maintained at the job site during installation and until the Project is complete.

D. All products and equipment shall be handled, installed, connected, cleaned, conditioned, and adjusted in accordance with the manufacturer's instructions and

specified requirements. Should job conditions or specified requirements conflict with the manufacturer’s instructions, such conflicts shall be called to the Engineer’s attention for resolution and revised instructions.

E. The Contractor shall perform work according to the manufacturer's instructions and not omit any preparatory step or installation procedure unless the instructions are specifically modified or the step or procedure exempted by the Contract Documents.

1.12 ACCEPTANCE OF INSTALLATION

A. The Engineer may accept an installation as ready for Substantial Completion when:

1. All components of the system are installed and tested, including without limitation hydrostatic tests, leak tests, and all other component tests as appropriate.
2. The appropriate certificates have been submitted.
3. All other Contract requirements for Substantial Completion have been satisfied.

1.13 PROTECTION AGAINST ELECTROLYSIS

A. Where dissimilar metals are used in conjunction with each other, suitable insulation shall be provided between adjoining surfaces so as to eliminate direct contact and any resultant electrolysis. The insulation shall be bituminous-impregnated felt, heavy -bituminous coatings, nonmetallic separators or washers, or other acceptable materials.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01650
DELIVERY, STORAGE, AND HANDLING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section specifies the general requirements for the delivery, handling, storage, and protection of all items required in the construction of the Work. Specific requirements, if any, are specified with the related item.

1.02 RELATED WORK (NOT USED)

1.03 SUBMITTALS (NOT USED)

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS (NOT USED)

1.06 QUALITY ASSURANCE (NOT USED)

1.07 WARRANTIES

A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall adhere to the requirements specified in this Section for storing and protecting the items.

B. The Contractor shall do the following:

1. The Contractor shall make arrangements to physically receive all deliveries to the project site. Materials and equipment shall be loaded and unloaded by methods affording adequate protection against damage. Every precaution shall be taken to prevent injury to the material or equipment during transportation and handling. Suitable power equipment shall be used and the material or equipment shall be under control at all times. Under no condition shall the material or equipment be dropped, bumped, or dragged. When a crane is used, a suitable hook or lift sling shall be used. The crane shall be so placed that all lifting is done in a vertical plane. Materials or equipment skid loaded, palletized, or handled on

skidways shall not be skidded or rolled against material or equipment already unloaded.

2. Material and equipment shall be delivered to the job site by means that will adequately support it and not subject it to undue stresses. Material and equipment damaged or injured in the process of transportation unloading or handling shall be rejected and immediately removed from the site.

3. The Contractor shall coordinate the delivery of all materials, including those furnished by the Owner. The Contractor shall be responsible for the proper transport, receiving, handling, and storing of all materials, and materials shall be protected to ensure their expected performance. Delivery schedules shall be coordinated by the Contractor, in advance, so that the Work will be done in a timely manner.

4. The Contractor shall coordinate deliveries of products with construction schedules to avoid conflict with work and conditions at the site. The Contractor shall also do the following:

    a. Deliver products in undamaged condition, in the manufacturer's original containers or packaging, with identifying labels intact and legible.
    b. Immediately on delivery, inspect shipments to ensure compliance with requirements of the Contract Documents and approved submittals and to ensure that the products are properly protected and undamaged.

5. The Contractor shall provide equipment and personnel to handle products by methods to prevent soiling or damage to products or packaging.

6. All materials and equipment shall be stored on-site in complete compliance with the manufacturer’s recommendations.

7. Store products subject to damage by the elements in weather-tight enclosures.

8. Maintain temperature and humidity within the ranges required by the manufacturer's instructions.

9. Store fabricated products above the ground, on blocking or skids to prevent soiling or staining. Cover products that are subject to deterioration with impervious sheet coverings, and provide adequate ventilation to avoid condensation.

10. All materials and equipment to be incorporated in the Work shall be handled and stored by the Contractor before, during, and after shipment in a manner that will prevent warping, twisting, bending, breaking, chipping, rusting, and any injury, theft, or damage of any kind to the material or equipment.

11. All materials which, in the opinion of the Engineer, have become so damaged as to be unfit for the use intended or specified shall be promptly removed from the site of the Work, and the Contractor shall receive no compensation for the damaged material or its removal.

12. The Contractor shall arrange storage in a manner to provide easy access for inspection and make periodic inspections of stored products to ensure that products are maintained under specified conditions, free from damage or deterioration.

13. The Contractor shall provide substantial coverings as necessary to protect installed products from traffic damage and subsequent construction operations and shall remove these coverings when they are no longer needed.

14. Should the Contractor fail to take proper action on storage and handling of equipment supplied under this Contract, within 7 days after written notice to do so has been given, the Owner retains the right to correct all deficiencies noted in the previously transmitted written notice and deduct the cost associated with these corrections from the Contractor’s Contract. These costs may include expenditures for labor, equipment use, administrative, clerical, engineering, and any other costs associated with making the necessary corrections.

15. Schedule delivery to reduce long-term onsite storage before installation and/or operation. Under no circumstances shall equipment be delivered to the site more than 1 month before installation without written authorization from the Engineer.

16. Coordinate delivery with installation to ensure minimum holding time for items that are hazardous, flammable, easily damaged, or sensitive to deterioration.

17. Deliver products to the site in the manufacturer's original sealed containers or other packing systems, complete with instructions for handling, storing, unpacking, protecting, and installing.

18. Unload and place all items delivered to the site in a manner which will not hamper normal construction operation nor that of subcontractors and other contractors and will not interfere with the flow of necessary traffic.

19. Provide necessary equipment and personnel to unload all items delivered to the site.

20. The Contractor shall store and protect products in accordance with the manufacturer's instructions, with seals and labels intact and legible. Follow storage instructions, review them with the Engineer, and keep a written record of this. Arrange storage to permit access for inspection.

21. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

22. Store cement and lime under a roof and off the ground and keep it completely dry at all times. All structural, miscellaneous, and reinforcing steel shall be stored off the ground or otherwise to prevent accumulations of dirt or grease and in a position to prevent accumulations of standing water and to minimize rusting. Beams shall be stored with the webs vertical. Precast concrete shall be handled and stored in a manner to prevent accumulations of dirt, standing water, staining, chipping, or cracking. Handle and store brick, block, and similar masonry products in a manner to keep breaking, cracking, and spilling to a minimum.

1.09 QUALIFICATIONS (NOT USED)

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01720
FIELD ENGINEERING

PART 1 GENERAL

1.01 SCOPE OF WORK

The Contractor shall do the following:

A. Provide and pay for the following field engineering services required for the Project:

1. Survey work required in the execution of the Project.
2. Civil, structural, or other professional engineering services specified or required to execute the Contractor's construction methods.

B. Retain the services of a registered land surveyor licensed in Florida to do the following:

1. Identify existing control points and property line corner stakes as required.
2. Verify all existing structure locations and all proposed structure corner locations, tank locations, and equipment locations within the Project site.
3. Maintain an accurate location of all buried piping 4 inches in diameter and larger.

1.02 RELATED WORK

A. Section 01100, Summary of Work.
B. Section 01330, Submittals and Acceptance.
C. Section 01650, Delivery, Storage, and Handling.
D. Section 01785, Record Documents.

1.03 SUBMITTALS

A. The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance.

B. The Contractor shall submit to the Engineer the name and address of the registered land surveyor or professional engineer.

C. On request of the Engineer, the Contractor shall submit documentation to verify the accuracy of field engineering work.

D. The Contractor shall submit a certificate signed by a registered land surveyor certifying that elevations and locations of improvements are in conformance or non-conformance with Contract Documents.

E. At the end of the Project and before final payment, submit the certified drawings as specified in Section 01785, Record Documents, with the Surveyor's title block, if applicable (signed and sealed by the registered land surveyor). These drawings shall be included with and made a part of the project record documents.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to in this Section shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

A. All work will be performed in accordance with the Minimum Technical Standards set forth by the Board of Professional Surveyors and Mappers.

1.06 QUALITY ASSURANCE

A. Existing basic horizontal and vertical control points for the project are those designated on Drawings.

B. Locate and protect control points before starting site work and preserve all permanent reference points during construction:

1. Make no changes or relocations without prior written notice to the Engineer.
2. Report to the Engineer when any reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations.
3. Require the surveyor to correctly replace project control points that may be lost or destroyed.
4. Establish replacements based on original survey control.

1.07 WARRANTIES

A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, for storing and protecting the items specified in this Section.

1.09 QUALIFICATIONS

A. Registered land surveyor of the discipline required for the specific service on the project, currently licensed in Florida.

1.10 SYSTEM DESCRIPTION

A. The Contractor shall establish a minimum of one permanent benchmark on the site, referenced to data established by survey control points:

1. Record locations, with horizontal and vertical data, on Record Documents.

B. Establish lines and levels, locate and lay out, by instrumentation and similar appropriate means:

1. Site improvements:

a. Utility slopes and invert elevations.

2. Building foundation, column locations, and floor levels.

C. From time to time, verify layouts by the same methods.

D. Maintain a complete and accurate log of all control and survey work as the work progresses.

E. As a condition for approval of monthly progress payment requests, update the project record drawings monthly based on the work performed during the month ending at the pay request. The Contractor shall coordinate this monthly with the Owner's representative on the site as part of the pay request.

F. Maintain an accurate record of piping changes, revisions, and modifications.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01740
FINAL CLEANING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall execute cleaning during progress of the Work and at the completion of the Work as required by General Conditions.

1.02 RELATED WORK (NOT USED)

1.03 SUBMITTALS (NOT USED)

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS (NOT USED)

1.06 QUALITY ASSURANCE (NOT USED)

1.07 WARRANTIES

A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, for storing and protecting the items specified in this Section.

1.09 QUALIFICATIONS (NOT USED)

1.10 ENVIRONMENTAL CONCERNS

A. Cleaning and disposal operations shall comply with codes, ordinances, regulations, and anti-pollution laws.

PART 2 PRODUCTS

2.01 CLEANING MATERIALS

The Contractor shall do the following:

A. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.

B. Use only those cleaning materials and methods recommended by the manufacturer of the surface material to be cleaned.

C. Use cleaning materials only on surfaces recommended by the cleaning material manufacturer.

PART 3 EXECUTION

3.01 PERIODIC CLEANING

The Contractor shall do the following:

A. Execute periodic cleaning to keep the work, the site, and adjacent properties free from accumulations of waste materials, rubbish, and windblown debris.

B. Provide onsite containers for the collection of waste materials, debris, and rubbish.

C. Remove waste materials, debris, and rubbish from the site periodically and dispose of at legal areas away from the site.

3.02 DUST CONTROL

The Contractor shall do the following:

A. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly coated surfaces.

3.03 FINAL CLEANING

The Contractor shall do the following:

A. Employ skilled workers for final cleaning.

B. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from interior and exterior surfaces exposed to view.

C. Broom clean exterior paved surfaces; rake clean other surfaces of the grounds.

D. Before final completion or Owner occupancy, inspect interior and exterior surfaces exposed to view and all work areas to verify that the entire Work is clean.

END OF SECTION

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SECTION 01770
PROJECT CLOSEOUT

PART 1 GENERAL

1.01 SCOPE OF WORK (NOT USED)

1.02 RELATED WORK

A. The Owner's Contract Documents.
B. Section 01000, Project Requirements.
C. Section 01300, Contract Administration.
D. Section 01740, Final Cleaning.
E. Section 01785, Record Documents.

1.03 SUBMITTALS (NOT USED)

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS (NOT USED)

1.06 QUALITY ASSURANCE (NOT USED)

1.07 WARRANTIES

A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, for storing and protecting the items specified in this Section.

1.09 QUALIFICATIONS (NOT USED)

1.10 SUBSTANTIAL COMPLETION

A. When the Contractor considers that the Work or designated portion of the Work is Substantially Complete, the Contractor shall submit written notice to the Engineer with a list of items to be completed or corrected.

B. If the Engineer’s inspection finds that the Work is not substantially complete, the Engineer will promptly notify the Contractor in writing, listing observed deficiencies.

C. The Contractor shall remedy deficiencies and send a second written notice of Substantial Completion.

D. When the Engineer finds the Work is Substantially Complete the Engineer will prepare a Certificate of Substantial Completion.

1.11 FINAL COMPLETION

A. When the Contractor considers that the Work or designated period of the Work is complete, the Contractor shall submit written certification to the Engineer indicating the following:

1. The Contract Documents have been reviewed.
2. The Work has been inspected for compliance with the Contract Documents.
3. The Work has been completed in accordance with the Contract Documents and deficiencies listed with Certificates of Substantial Completion have been corrected.
4. The Work is complete and ready for final inspection.
5. All required shop drawings, catalog cuts, maintenance manuals, instruction manuals, test reports, samples, operational manuals, and all other submittals have been submitted and reviewed by the Engineer.
6. All deliverables have been delivered or placed as accepted by the Engineer.

B. If the Engineer’s inspection reveals that the Work is incomplete, the Engineer will promptly notify the Contractor in writing listing observed deficiencies.

C. The Contractor shall remedy deficiencies and send a second certification of Final Completion.

D. When the Engineer finds that the Work is complete, the Engineer will consider closeout submittals.

1.12 REINSPECTION FEES

A. If the status of Completion of Work requires more than one re-inspection by the Engineer due to failure of the Work to comply with the Contractor's claims on initial inspection, the Owner will deduct from the final payment to the Contractor the amount of the Engineer’s compensation for additional re-inspection services.

The Engineer shall be compensated at the hourly rates in Section 01100, Summary of Work, Part 1.12, Reimbursement Fees.

1.13 CLOSEOUT SUBMITTALS

A. Evidence of Compliance with Requirements of Governing Authorities:

1. All required Certificates of Inspection.

B. Record Documents: Under provisions of Section 01785, Record Documents.

C. Evidence of Payment and Release of Liens: In accordance with Conditions of the Contract.

D. Consent of Surety to Final Payment.

1.14 STATEMENT OF ADJUSTMENT OF ACCOUNTS

A. Submit final statement reflecting adjustments to total Contract Price, indicating the following:

1. Original total Contract Price.
2. Previous change orders.
3. Changes under allowances.
4. Changes under unit prices.
5. Deductions for uncorrected Work.
6. Penalties and bonuses.
7. Deductions for liquidated damages.
8. Deductions for re-inspection fees.
9. Other adjustments to total Contract Price.
10. Total Contract Price as adjusted.
11. Previous payments.
12. Sum remaining due.

B. The Engineer will issue a final Change Order reflecting approved adjustments to the total Contract Price not previously made by change orders.

1.15 APPLICATION FOR FINAL PAYMENT

A. Submit application for final payment in accordance with provisions of the Owners Contract Documents.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01780
WARRANTIES AND BONDS

PART 1 GENERAL

1.01 SCOPE OF WORK

The Contractor shall do the following:

A. Compile specified warranties and bonds.
B. Co-execute submittals when so specified.
C. Review submittals to verify compliance with Contract Documents.
D. Submit submittals to the Engineer for review.

1.02 RELATED WORK

A. The Owner's Contract Documents.
B. Section 01600, Materials and Equipment.

1.03 SUBMITTALS

The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance:

A. Assemble warranties, bonds, and service and maintenance contracts executed by each of the respective manufacturers, suppliers, and subcontractors.

B. Number of original signed copies required: two each.

C. Table of Contents: Neatly typed, in sequence of the Specifications. Provide completion information for each item as follows:

1. Product or work item.

2. Firm, address, telephone and fax numbers, and name and email of principal.

3. Scope.

4. Date of beginning of warranty, bond, or service and maintenance contract.

5. Duration of warranty, bond, or service and maintenance contract.

6. Provide information for the Owner's personnel:

   a. Proper procedure in case of failure.
   b. Instances that might affect the validity of warranty or bond.

7. Contractor, with address, telephone and fax numbers, and the name and email of responsible principal.

D. Submittal of warranties, bonds, and service and maintenance contracts shall be included in submittals for review and before Final Completion with actual dates included.

E. The Contractor’s obligation to correct defective or nonconforming Work shall run for 1 year (or such longer period may otherwise be specified in the Contract Documents) beginning from the date Substantial Completion is achieved.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS (NOT USED)

1.06 QUALITY ASSURANCE (NOT USED)

1.07 WARRANTIES

A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and this Section.

B. All mechanical and electrical equipment together with devices of whatever nature and all components which are furnished and/or installed by the Contractor shall be guaranteed.

C. The guarantee shall be against the manufacturing and/or design inadequacies, materials, and workmanship not in conformity, improper assembly, hidden damage, failure of devices and/or components, excessive leakage, or other circumstances which would cause the equipment to fail under normal design and/or specific operating conditions for 1 year or such longer period as may be shown and/or specified from and after the date of Substantial Completion.

D. The Contractor shall replace and install each piece of equipment, device, or component which shall fail within the term specified above of the guarantee with reasonable promptness without increase in the Contract Price. If the Contractor fails to provide timely repairs as specified in this Section, the Owner shall issue a claim against the Contractor’s Bond. In some instances, if approved by the Owner, the Contractor may be allowed to repair the equipment.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, for storing and protecting the items specified in this Section.

1.09 QUALIFICATIONS (NOT USED)

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01785
RECORD DOCUMENTS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section details the minimum requirements for the Contractor for maintenance and recording of Record Documents and Record Drawings.

1.02 RELATED WORK

A. Section 01000, Project Requirements.
B. Section 01300, Contract Administration.
C. Section 01330, Submittal and Acceptance.
D. Section 01770, Project Closeout.

1.03 SUBMITTALS

The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance, and record documents as specified below:

A. The Contractor shall institute a computerized record control program.

B. The Contractor shall make documents and samples available at all times for inspection by the Engineer.

C. At Contract closeout, the Contractor shall transmit Record Documents including Record Drawings, and samples with cover letter to the Engineer, listing the following:

1. Date.
2. Project title and number.
3. Contractor’s name and addresses.
4. Number and Title of each Record Document.
5. Signature of Contractor or its Authorized Representative.
6. Contract Section and Subsection numbers.
7. Location.

D. Before assembling and submitting records, the Contractor shall review for completeness the records maintained by its subcontractors.

E. Tracings of all Construction Documents and Shop Drawings made by the Contractor, subcontractors, and suppliers of materials or equipment shall be corrected to show the Work as actually completed or installed.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS (NOT USED)

1.06 QUALITY ASSURANCE (NOT USED)

1.07 WARRANTIES

A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, for storing and protecting the items specified in this Section.

1.09 QUALIFICATIONS (NOT USED)

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 PROJECT RECORD

A. The Contractor shall label and file Record Documents and samples in accordance with the corresponding Specification Section number. Each document shall be labeled “PROJECT RECORD” in neat, large, printed letters. Record Documents shall be maintained in a clean, dry, and legible condition. Record documents shall not be used for construction purposes.

3.02 RECORDING

The Contractor shall record construction information as follows (refer to the Record Drawing Checklist at the end of this Section for additional requirements):

A. Record and update daily Record information from field notes on a set of opaque drawings and to the satisfaction of the Engineer.

1. The Contractor shall maintain a separate field log book containing swing ties to all underground infrastructure including, but not limited to, fittings,

service taps, disinfection ports, buried valves, capped lines for future connections, and ends of water mains placed out of service. Swing ties shall be from permanent structures. The log book shall become the property of the Owner at the conclusion of the project.

B. Provide felt tip marking pens, maintaining separate colors for each major system, for recording information.

C. Record information concurrently (daily) with construction progress. Work shall not be concealed until required information is recorded.

D. Record Drawings shall be a special revision of the construction Drawings and shall reflect the following:

1. Measured horizontal and vertical locations of underground utilities and appurtenances referenced to permanent surface improvements. **All vertical elevations shall be converted from NGVD29 to NAVD88.**

2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of construction.

3. Field changes of dimension and detail.

4. Changes made by modifications.

5. Details not on original construction Drawings.

6. The force main system shall be located and the locations shall be depicted and noted on the Record Drawings by swing ties from fixed structures, as well as northing and easting based on State Plane Coordinates (NAD(07) Florida West Zone), and by elevation relative to established benchmarks.

a. Elements of the utility systems that shall be located and noted by swing ties, northing, easting, and elevation:

(1) Valves (top of operating nut).
(2) All fittings.
(3) Top of pipe on water mains, force mains, and reclaimed water mains at intervals no greater than 50 feet apart and at locations where there is a substantial grade change.

b. At locations where a top of pipe elevation is required for pipeline, a top of ground or top of pavement elevation shall also be measured and noted on the Drawings.

c. Other miscellaneous utilities and structures with features at or above the ground surface shall be located and noted by northing, easting, and elevation.

7. On Record Drawings, at locations where the horizontal positions of constructed pipelines or other utility structures deviate by more than 5 feet (as scaled on the Drawing) from the horizontal positions that were shown on the construction Drawings, the actual positions of the pipelines or structures shall be measured and they shall be depicted in their actual positions on the Record Drawings and their original design positions shall be crossed-hatched out or screen shaded.

8. Record information shall include a thorough description of the pipes that have been installed, including type of pipe material, size, class, dimension ratio, and other basic information.

9. For new valves, the manufacture type (e.g., gate, plug, butterfly), size (pipe nominal diameter), and make (manufacturer) of each valve shall be noted on the Record Drawings.

10. Record information shall be presented in a clear and comprehensible form.

11. The drawing scales used in the Record Drawings shall be the same as were used in the construction Drawings, and the sheet number of each Record Drawing sheet shall be the same as the sheet numbers that were used on the construction Drawings from which the Record Drawings originate.

12. All sheets that were used to depict locations and elevations of utility structures in the construction Drawings shall be included in the Record Drawing set.

13. Record Drawings shall accurately depict all existing improvements lying within the immediate vicinity of the constructed facilities. Existing improvements shall include, but not be limited to, sidewalks, fences, road surfaces, buildings, and other utilities. Immediate vicinity includes areas within utility easements includes areas within rights of way, and also includes areas within 15 feet of potable water mains, sanitary force mains, and gravity sewer mains. Immediate vicinity also includes areas within 10 feet of potable water meters, backflow preventers, and fire hydrants. Right of way, easements, and property corners shall be shown and shall be of sufficient detail as to determine if the constructed utilities are within the easements or rights of way. A reference to the recording document (O.R. Book or Plat Book and Page) shall be included with any depiction of a right-of-way or easement.

14. Each roadway depicted on the Drawings shall have the correct roadway name noted on it.

15. Horizontal locations required for valves, fittings, services, and other utility structures shall be to the center of each installation. Top of ground or pavement elevations required along pipelines shall be reported to the nearest 0.1 foot. Top of pipe elevations shall be reported to the nearest 0.1 foot. Elevations of manhole rims and manhole pipe inverts shall be reported to the nearest 0.1 foot. Top of wall elevations shall be reported to the nearest 0.02 foot.

16. Abandoned-in-place pipes shall be shown in their actual positions.

E. The Contractor shall present the field log book containing swing tie information and red-lined as-built Drawings at each monthly construction meeting for review by the Owner and Engineer. Failure to produce adequate as-built information will be grounds for withholding appropriate funds from the monthly payment applications.

F. CAD Requirements for Record Drawings: The Contractor shall provide the Engineer and the City with a complete set of Record Drawings in the AutoCAD 2014 or 2016 version of AutoCAD format upon completion of the Work. No additional compensation will be allowed for the Contractor to provide the Record Drawings except those allowed in the bid form. The Contractor shall use the AutoCAD drawings furnished by the Engineer for this purpose. Record Drawings must be submitted in the AutoCAD format of the contract Drawings. No other CAD software or format will be accepted. It is the Contractor's sole responsibility to ensure that the Record Drawings conform to the following CAD requirements:

1. Two sets of hard copy drawings shall be submitted to the Engineer as well as digital AutoCAD files on a CD-ROM. Each CD shall be clearly labeled with the appropriate project number, client name, date, and file names included on each CD. If files are compressed, a description of the compression software must be included along with a copy of the appropriate uncompressing software.
2. All changes to drawings must be done in accordance with the same scale of the drawing revised and shall be delineated by placing a "cloud" around the areas revised and adding a revision triangle indicating the appropriate revision number.
3. Each drawing must have the revision block completed to indicate the revision number, date, and initials of the person revising the drawing. The description of the revision must say "Record Drawing." This procedure must be followed for every drawing even when no changes are made to the drawing.

4. All revisions to drawings must be put on separate layers with the layer names prefixed Record followed by the appropriate existing layer name. The colors and line types of the appropriate existing layers shall be adhered to when creating new layers.
5. The Contractor shall supply one full set of Record Drawings on reproducible black line prints and five full sets of opaque copies.

G. The Contractor shall have the Licensed Land Surveyor certify the Record Drawings as being true, correct, and complete, and data were collected in the field by the surveyor or by a representative under the direct supervision of the surveyor. All visible record features, including sewer inverts, must be measured and located by the surveyor or by personnel under his or her direct supervision. The certifying surveyor shall be fully responsible for the accuracy of the record locations and elevations shown on the Record Drawings.

1. The Contractor's surveyor shall resurvey all visible surface structures as part of the Record Drawing submittal, including, but not limited to, valve boxes, hydrants, relocated or new water meter boxes, automatic blow-off assemblies, walls, gates, and weirs.
2. Horizontal locations shall be tied to NAD83.

RECORD DRAWING CHECKLIST

The following information shall be addressed on the as-built plan

Project Name: _____

Engineer: _____

Date: _____

GENERAL:

☐ Do the record drawings indicate the locations and elevations of the improvements that have been built?

☐ Do the plans indicate the vertical datum and bench marks used as the basis for this site improvement?

☐ Are the record drawings a revision of the approved construction plans and depict design information crossed out and replaced by accurate record information?

☐ Has a final inspection of the site prior to any certificate of occupancy happened?

☐ Are the drawings signed and sealed by the Engineer of record attesting to compliance with the development approval and by the Professional Surveyor and Mapper attesting to accuracy on location and elevations?

☐ Did the City receive **Two (2) signed and sealed "As-Built" / "Record Drawing"** of each utility and/or roadway design?

☐ Did the City receive electronic PDF and AutoCAD® files of the project with any/all AutoCAD® supporting files? **Version 2014 or 2016.**

☐ Were the AutoCAD® drawings drawn in the correct vertical datum and projection?

☐ If there are any locations where the horizontal position of the constructed pipelines or structures deviated by more than 5-feet (as scaled on the drawings) from the horizontal positions that were shown on the construction drawings are the actual positions of the structures/pipelines depicted on the Record Drawings in their actual positions and their original design positions cross-hatched out or screen shaded?

SEWER:

☐ Are the as-built pipe sizes and type of pipe used shown?

☐ Are the as-built rims and invert elevations for manholes shown?

☐ Are the as-built percent of grade for gravity lines shown on the profile sheets?

- ☐ Is the stationing recorded from manhole to manhole with service locations and offset distances shown on layout?

- ☐ Is the force main located with stationing of the main along the route with any off-set measurements to curb line or center line of roadway including any air release valves?

- ☐ Is there an as-built lift station plot plan survey with a cross section view of the wet well and valve box details showing the pump manufacture, horsepower of pump, impeller size, inverts, slab elevation, etc.?

- ☐ Is the elevation of the top of nut on all force main valves shown?

- ☐ Were there any field changes of dimensions, elevations and/or details? If so were they shown in a clouded area or by insert on record drawings?

- ☐ Were all manholes, valves, clean outs, lift stations, air release valves, etc. located by horizontal and vertical measurements referenced to permanent surface improvements using Florida State Plane Coordinates?

END OF SECTION

DIVISION 2

SITE CONSTRUCTION

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SECTION 02220
DEMOLITION AND MODIFICATIONS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment, and incidentals required and demolish, modify, remove, and dispose of work shown on the Drawings and as specified in this Section.

B. The work includes but is not limited to demolishing, modifying, and removing existing materials, equipment, or work necessary to install the new work as shown on the Drawings and as specified in this Section and to connect with existing work in an approved manner.

C. Demolition, modifications, and removals that may be specified under other sections shall conform to requirements of this Section.

D. Demolition and modifications include, but are not limited to:

1. Providing temporary access to the headworks.
2. Providing temporary means to maintain flow through the headworks during construction.
3. Removal and relocation of existing stairs.
4. Demolition of the existing concrete slab/foundation under the stairs.
5. Construction of a new slab/foundation for the stairs at the new location.
6. Construction of a new landing to connect stairs to the existing structure at the new location.
7. Constructing a new force main across the existing driveway and connecting to an existing force main at the northeast end of the project and to the headworks at the southwest end of the project.

E. Blasting and the use of explosives will not be permitted for any demolition work.

1.02 RELATED WORK

A. Section 01100, Summary of Work.
B. Section 01330, Submittals and Acceptance.
C. Section 01350, Environmental Protection Procedures.

1.03 SUBMITTALS

The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance:

A. Submit to the Engineer six copies of proposed methods and operations of demolition of the structures and modifications before beginning work. Include in the schedule the coordination of shutoff, capping, and continuation of utility service as required.

B. Furnish a detailed sequence of demolition and removal work to ensure the uninterrupted progress of the Owner's operations. The sequence shall be compatible with sequence of construction and shutdown coordination requirements.

C. Before beginning demolition work, the Contractor shall complete all modifications necessary to maintain flow through the headworks. Actual work shall not begin until the Engineer has observed and approved the modifications and authorized beginning the demolition work in writing.

D. Submit Erection Drawings indicating the means of shoring/bracing and temporary access required under Article 3.03. The Submittal shall include complete layouts, location plans, and shoring/bracing sequence schedule. The Submittal shall have the stamp of the Professional Engineer (PE) specified under Paragraph 1.03E.

E. Certification: The PE shall be responsible for the design of the temporary access to and shoring/bracing of the existing structure and hung utilities. Before construction, the PE shall submit a PE Certification Form prepared, stamped, and signed by the PE registered in the State of Florida verifying that the design will adequately provide support during construction.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS (NOT USED)

1.06 QUALITY ASSURANCE

A. The Contractor shall engage the service of a PE registered in the State of Florida for the design of the temporary access to and shoring/bracing of the existing structure and hung utilities during construction.

1.07 WARRANTIES

A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, for storing and protecting the items specified in this Section.

1.09 QUALIFICATIONS (NOT USED)

1.10 TESTING REQUIREMENTS (NOT USED)

1.11 MAINTENANCE (NOT USED)

1.12 RECORD DRAWINGS (NOT USED)

1.13 JOB CONDITIONS

A. Protection

1. The Contractor shall conduct the demolition and removal work to prevent damage or injury to structures, equipment, piping, instrumentation, conduit, light fixtures, etc., and occupants of the structures and to adjacent features which might result from falling debris or other causes, and so as not to interfere with the use and free and safe passage to and from adjacent structures.
2. Specific items to be protected include, but are not limited to, headworks railings, headworks piping, and building walls.

B. Scheduling

1. Carry out operations so as to avoid interference with operations and work in the existing facilities.

C. Notification

1. At least 48 hours before beginning demolition or removal, notify the Engineer in writing of the proposed schedule of the demolition or removal. The Owner shall inspect the existing equipment and identify and mark those items that are to remain the property of the Owner. No removals shall be started without the permission of the Engineer.

D. Conditions of Structures

1. The Owner and the Engineer assume no responsibility for the actual condition of the structures to be demolished or modified.
2. Conditions existing at the time of inspection for bidding purposes will be maintained by the Owner insofar as practicable. However, variations within a structure may occur before the start of demolition work.

E. Repairs to Damage

1. The Contractor shall promptly repair damage caused to adjacent facilities by demolition operation when directed by the Engineer and at no cost to the Owner. Repairs shall be made to a condition equal or better to that which existed before construction.

F. Traffic Access

1. The Contractor shall conduct demolition and modification operations and remove equipment and debris to ensure minimum interference with roads onsite and to ensure minimum interference with occupied or used facilities.
2. Special attention is directed towards maintaining safe and convenient access to the existing facilities by plant personnel and service contractors.

1.14 RULES AND REGULATIONS

A. The Florida Building Code shall control the demolition, modification or alteration of the existing buildings or structures.

1.15 DISPOSAL OF MATERIAL

A. Salvageable material and equipment shall become the property of the Owner. The Contractor shall dismantle all such items to a size that can be readily handled and deliver them to a designated storage area.

B. All other material and items of equipment shall become the Contractor's property and must be removed from the site.

C. Storing or selling removed items on the site will not be allowed.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

A. All materials and equipment removed from existing work shall become the property of the Contractor, except for those that the Owner has identified and marked for his/her use. All materials and equipment marked by the Owner to remain shall be carefully removed so as not to be damaged and shall be cleaned and stored on or adjacent to the site in a protected place specified by the Engineer or loaded onto trucks provided by the Owner.

B. The Contractor shall dispose of all demolition materials, equipment, debris, and all other items—except those marked by the Owner to remain—off the site and in conformance with all existing applicable laws and regulations. The Contractor shall not use the dumpsters at the headworks for any disposal.

C. Pollution Controls

1. Use water sprinkling, temporary enclosures, and other suitable methods to limit the amount of dust and dirt rising and scattering in the air to the lowest practical level. Comply with governing regulations pertaining to environmental protection.

   a. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.
   b. Clean adjacent structures, facilities, and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to conditions existing before starting the work.

3.02 STRUCTURAL REMOVALS

A. The Contractor shall remove structures to the lines and grades shown unless otherwise directed by the Engineer.

B. All demolition debris shall be removed and taken from the site, unless otherwise approved by the Engineer.

C. After parts or all of slabs and like work which tie into new work or existing work are removed, the point of junction shall be neatly repaired so as to leave only finished edges and surface exposed.

3.03 DEMOLITION, REPLACEMENT, AND REPAIR

A. Structural elements shall not be overstressed. The Contractor shall be responsible for shoring and/or bracing as required and indicated on the Drawings for adequate structural support as a result of work performed.

B. The shoring and/or bracing shall remain in place until the repair mortar and/or concrete in each stage has attained design strength.

3.04 CLEAN-UP

A. The Contractor shall remove from the site all debris resulting from the demolition operations as it accumulates. Upon completion of the work, the Contractor shall remove all materials, equipment, waste, and debris of every sort and shall leave the premises clean, neat, and orderly.

END OF SECTION

SECTION 02300
EARTHWORK FOR STRUCTURES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, equipment, tools, appliances, and materials and perform all operations as needed, including, but not limited to, the following:

1. Preparing subgrades for slab-on-grade, walks, pavements, and lawns and grasses.
2. Excavating and backfilling for buildings and structures.
3. Laying the subbase course for concrete sidewalks and pavements.

1.02 RELATED WORK

A. Section 01350, Environmental Protection Procedures.
B. Section 01500, Temporary Facilities and Controls.

1.03 SUBMITTALS

The Contractor shall submit the following shop drawings in accordance with Section 01330, Submittals and Acceptance:

A. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:

1. Classification according to ASTM D2487 of each onsite and borrow soil material proposed for fill and backfill.
2. Laboratory compaction curve according to ASTM D1557 for each onsite and borrow soil material proposed for fill and backfill.

B. The Contractor shall submit records before the start of this work. The Contractor shall verify that the existing conditions are correct as shown on the plans and mentioned in these Specifications. The Contractor shall note any discrepancies found immediately and notify the Owner and Engineer.

The records shall include the following:

1. The location of all underground utilities, structures, etc. surrounding the areas to be excavated that may be impacted by the work.

2. The location of test excavations.
3. The location of inspections.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to in this Specification Section shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

A. American Society for Testing and Materials (ASTM)

1. ASTM C33—Standard Specification for Concrete Aggregates.
2. ASTM D698—Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).
3. ASTM D1556—Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
4. ASTM D1557—Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).
5. ASTM D2167—Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
6. ASTM D2487—Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
7. ASTM D2937—Standard Test Method for Density of Soil in Place by the Drive-Cylinder Method.
8. ASTM D2940—Standard Specification for Graded Aggregate Material For Bases or Subbases for Highways or Airports.
9. ASTM D3740—Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
10. ASTM D6938—Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
11. ASTM E329—Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.

1.06 QUALITY ASSURANCE

A. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E329 to conduct soil materials and definition testing, as documented according to ASTM D3740.

B. The Contractor shall do the following:

1. Ensure that excavations provide adequate working space and clearance for the work to be performed and for installing piping and buried utilities. In no case shall excavation faces be undercut.
2. Ensure that foundation surfaces are clean and free of loose material of any kind when pipelines and buried utilities are placed on them.
3. Excavate, trench, and backfill in compliance with applicable requirements of governing authorities having jurisdiction.
4. Ensure that shoring and sheeting for excavations are designed by a Florida-registered Professional Engineer and are in accordance with the Occupational Safety and Health Administration (OSHA) Document 2226, *Safe Working Practices—Excavating and Trenching*.
5. Before beginning any excavation or grading, ensure the accuracy of all survey data indicated on the Contract Drawings and in the Specifications and/or as provided. If the Contractor discovers any inaccuracies, errors, or omissions in the survey data, the Contractor shall immediately notify the Owner so that proper adjustments can be anticipated or ordered. If the Contractor begins any excavation or grading, this shall be considered an acceptance of the survey data by the Contractor, after which time the Contractor has no claim against the Owner resulting from alleged errors, omissions, or inaccuracies of the survey data.
6. Ensure that tolerances for excavation are plus or minus 0.10 foot to the required line and to the required grade. Tolerance for compaction of in-place material shall be plus or minus 0.10 foot to the required grade, unless otherwise noted.
7. Remove unsatisfactory materials and unsuitable materials including muck, silts, peat, and other loose and very loose compressible soils from excavations before placing pipe foundation, bedding, and buried utilities.

1.07 WARRANTIES

A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, for storing and protecting the items specified in this Section.

1.09 QUALIFICATIONS (NOT USED)

1.10 TESTING REQUIREMENTS (NOT USED)

1.11 MAINTENANCE (NOT USED)

1.12 RECORD DRAWINGS (NOT USED)

1.13 PROJECT CONDITIONS

A. Existing Utilities: The Contractor shall not interrupt utilities serving facilities occupied by the Owner or others unless permitted to do so in writing by the Engineer and then only after arranging to provide temporary utility services according to requirements indicated.

1. Notify the Owner and Engineer not less than 2 business days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without the Engineer's written permission.
3. Existing utilities in the vicinity of the project are shown on the Drawings based on a SUE investigation. Contactor shall verify utility locations for the Project area before excavating.

B. The Contractor shall demolish and completely remove from the site underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

1.14 DEFINITIONS

A. *Backfill*: Soil material or controlled low-strength material used to fill an excavation.

1. *Initial Backfill*: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. *Final Backfill*: Backfill placed over initial backfill to fill a trench.

B. *Base Course*: The course placed between the subbase course and hot-mix asphalt paving.

C. *Bedding Course*: The course placed over the excavated subgrade in a trench before laying pipe.

D. *Borrow Soil*: Satisfactory soil imported from off-site for use as fill or backfill.

E. *Drainage Course*: The course supporting the slab-on-grade that also minimizes the upward capillary flow of pore water.

F. *Excavation*: Removing material encountered above subgrade elevations and to lines and dimensions indicated.

1. *Authorized Additional Excavation*: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by the Engineer. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.
2. *Unauthorized Excavation*: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by the Engineer. Unauthorized excavation as well as remedial work directed by the Engineer shall be without additional compensation.

G. *Fill*: Soil materials used to raise existing grades.

H. *Structures*: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

I. *Subgrade*: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

J. *Utilities*: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

PART 2 PRODUCTS

2.01 SOIL MATERIALS

A. General: The Contractor shall provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: ASTM D2487 Soil Classification Groups SW and SP or a combination of these groups, free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsuitable Soils: Soil Classification Groups GW, GP, GM, GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D2487, or a combination of these groups.

1. Unsuitable soils also include satisfactory soils not maintained within 2% of optimum moisture content at time of compaction.

D. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940; with at least 95% passing a 1-1/2-inch sieve and not more than 8% passing a No. 200 sieve.

E. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940; with at least 90% passing a 1-1/2-inch sieve and not more than 12% passing a No. 200 sieve.

F. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940; except with 100% passing a 1-inch sieve and not more than 8% passing a No. 200 sieve.

G. Sand: ASTM C33; fine aggregate, natural, or manufactured sand.

H. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

PART 3 EXECUTION

3.01 PREPARATION

A. The Contractor shall protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

B. The Contractor shall protect and maintain erosion and sedimentation controls that are specified in Section 01350, Environmental Protection Procedures.

3.02 DEWATERING

A. The Contractor shall prevent surface water and groundwater from entering excavations, from ponding on prepared subgrades, and from flooding the Project site and surrounding area.

B. The Contractor shall protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

3.03 EXPLOSIVES

A. Explosives: Do not use explosives.

3.04 EXCAVATION, GENERAL

A. Unclassified Excavation: The Contractor shall excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

1. If excavated materials intended for fill and backfill include unsuitable soil materials, replace with satisfactory soil materials.

3.05 EXCAVATION FOR STRUCTURES

A. The Contractor shall excavate to indicated elevations and dimensions within a tolerance of plus or minus 0.10 foot. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb the bottom of the excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

3.06 EXCAVATION FOR WALKS AND PAVEMENTS

A. The Contractor shall excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.07 EXCAVATION FOR UTILITY TRENCHES (SEE SECTION 02305, EARTHWORK FOR UTILITIES)

3.08 SUBGRADE INSPECTION

A. The Contractor shall notify the Engineer when excavations have reached the required subgrade.

B. If the Engineer determines that unsuitable soil is present, the Contractor shall continue excavation and replace with compacted backfill or fill material as directed.

C. The Contractor shall proof-roll subgrade below the building slabs and pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

1. Completely proof-roll the subgrade in one direction**,** repeating proof-rolling in the direction perpendicular to the first direction. Limit vehicle speed to 3 miles per hour (mph).
2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by the Engineer, and replace with compacted backfill or fill as directed.

D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices or additional work.

E. As directed by the Engineer, the Contractor shall reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities without additional compensation.

3.09 UNAUTHORIZED EXCAVATION

A. The Contractor shall fill unauthorized excavation under foundations or wall footings by extending the bottom elevation of concrete foundation or footing to the excavation bottom without altering top elevation. Lean concrete fill, with

28-day compressive strength of 2,500 pounds per square inch (psi), may be used when approved by the Engineer.

1. Fill unauthorized excavations under other construction or utility pipe as directed by the Engineer.

3.10 STORAGE OF SOIL MATERIALS

A. The Contractor shall stockpile excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water.

1. Stockpile soil materials away from edge of excavations. Do not store within the drip line of remaining trees.

3.11 BACKFILL

A. The Contractor shall place and compact backfill in excavations promptly, but not before completing the following:

1. Constructing below finish grade, including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for Record Documents.
3. Testing and inspecting underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring, bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. The Contractor shall place backfill on subgrades free of mud.

3.12 UTILITY TRENCH BACKFILL (SEE SECTION 02305, EARTHWORK FOR UTILITIES)

3.13 SOIL FILL

A. The Contractor shall plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. The Contractor shall place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use satisfactory soil material.
2. Under walks and pavements, use satisfactory soil material.

C. The Contractor shall place soil fill on subgrades free of mud.

3.14 SOIL MOISTURE CONTROL

A. The Contractor shall uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compacting to within 2% of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy.
2. Remove and replace or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 2% and is too wet to compact to the specified dry unit weight.

3.15 COMPACTION OF SOIL BACKFILLS AND FILLS

A. The Contractor shall place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. The Contractor shall place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.

C. The Contractor shall compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D698:

1. Under structures, building slabs, steps, and pavements, scarify and recompact the top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95%.
2. Under walkways, scarify and recompact the top 6 inches below subgrade and compact each layer of backfill or fill soil material at 92%.
3. Under lawn or unpaved areas, scarify and recompact the top 6 inches below subgrade and compact each layer of backfill or fill soil material at 90%.

4. For utility trenches, compact each layer of initial and final backfill soil material at 85% in unpaved lawn areas. Final backfill compaction shall meet the requirement listed above depending on the location of the trench.

3.16 GRADING

A. General: The Contractor shall uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Lawn or Unpaved Areas: Plus or minus 1 inch.
2. Walks: Plus or minus 1 inch.
3. Pavements: Plus or minus 1/2 inch.

3.17 FIELD QUALITY CONTROL

A. The number and location of the tests shall be as specified in these Specifications and as directed by the Engineer during construction.

B. The Contractor shall coordinate activity with the Engineer and the testing agency to permit testing as directed in the presence of the Engineer.

C. The cost of all testing to achieve specified requirements shall be borne by the Contractor.

D. The costs of any and all retests due to failure to achieve specified requirements shall be solely borne by the Contractor.

E. All materials proposed for use shall be tested as follows:

Material	Required Test	Min No. Tests
Satisfactory Soil Materials	Soil Classification using ASTM D2487 (including all tests contained therein)	One per source of materials to determine conformance with materials specified herein; additional test whenever there is any apparent change.
	Soil moisture-density relationship using Modified Proctor ASTM D1557	One per source of material or apparent change in material.

F. The Contractor shall allow the testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after the test results for previously completed work comply with requirements.

G. The testing agency will test compaction of soils in place according to ASTM D1556, ASTM D2167, ASTM D2937, and ASTM D6938 as applicable. Tests will be performed at the following locations and frequencies:

1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2,000 square feet or less of paved area or building slab, but in no case fewer than three tests.
2. Trench Backfill: At each compacted initial and final backfill layer, at least one test for each 100 feet or less of trench length but no fewer than two tests.

H. When the testing agency reports that subgrades, fills, or backfills have not achieved the degree of compaction specified, the Contractor shall scarify and moisten or aerate or remove and replace soil to the depth required and recompact and retest until specified compaction is obtained.

I. The approved testing agency shall transmit copies of field-testing results as follows:

1. One copy to the Owner.
2. Two copies to the Engineer.
3. Two copies to the Contractor.

The field test reports shall include, at a minimum, project title; project location; location of sample(s) tested; time of testing; date of testing; testing person's full name; testing agency name, address, and telephone number; and test results.

J. No soil material shall be used until (1) the Engineer has reviewed and approved test reports and (2) the Contractor submits certification that the soil material

proposed for construction is clean and meets gradation and other parameters specified in this Specification.

K. At no cost to the Owner, the Contractor shall remove and replace or correct all materials and work that tests indicate do not conform, in the opinion of the Engineer, to the requirements of these Specifications.

L. The results of in-place density tests shall be considered satisfactory if the density in each instance is equal to or greater than the specified density. Soil moisture content at the time of testing shall conform to requirements of these Specifications.

M. Where unsatisfactory compaction is revealed by the tests, the Contractor shall re-excavate, backfill, recompact, and/or rework the backfill as required to obtain the required degree of compaction over the entire depth of the excavation.

3.18 PROTECTION

A. Protecting Graded Areas: The Contractor shall protect newly graded areas from traffic and erosion and keep them free of trash and debris.

B. The Contractor shall repair and reestablish grades to the specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by the Engineer and reshape and recompact.

C. Where settling occurs before the Project Correction Period elapses, The Contractor shall remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.19 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: The Contractor shall transport surplus satisfactory soil to designated storage areas on the Owner's property and stockpile and spread this soil as directed by the Engineer.

1. Remove waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off the Owner's property.

END OF SECTION

SECTION 02305
EARTHWORK FOR UTILITIES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall provide all materials, equipment, labor, and work as needed to completely construct the project in accordance with the Contract Documents. This work includes but is not limited to the following:

1. Excavating and removing unsatisfactory materials.
2. Preparing trench foundations.
3. Providing satisfactory material for all trenches as specified and as required.
4. Obtaining, storing, maintaining, and disposing of materials.
5. Dewatering, shoring, and sheeting.
6. Placing, compacting, testing, final grading, and demolishing subgrade.
7. Performing all other work required by the Contract Documents.

B. The Contractor is responsible for performing all work so as not to damage existing roadways, facilities, utilities, structures, etc. and shall repair and replace such damage to equal or better than its original undamaged condition without cost to the Owner.

C. The Contractor shall examine the site before submitting a bid, taking into consideration all conditions that may affect the work.

D. The Contractor shall coordinate all additional subsurface investigations and testing included with this work with the Engineer before performing the excavation and foundation preparation work. In general, if the Contractor finds different and unsuitable/unsatisfactory soil conditions during the work, the Contractor shall notify the Engineer and the Owner immediately.

1.02 RELATED WORK

A. Section 01350, Environmental Protection Procedures.
B. Section 02300, Earthwork for Structures.

1.03 SUBMITTALS

The Contractor shall submit the following shop drawings in accordance with Section 01330, Submittals and Acceptance:

A. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:

1. Classification according to ASTM D2487 of each onsite and borrow soil material proposed for fill and backfill.
2. Laboratory compaction curve according to ASTM D1557 for each onsite and borrow soil material proposed for fill and backfill.

B. The Contractor shall submit records before the start of this work. The Contractor shall verify that the existing conditions are correct as shown on the plans and mentioned in these Specifications. The Contractor shall note any discrepancies found immediately and notify the Owner and Engineer.

The records shall include the following:

1. Location of all existing underground utilities, structures, etc., surrounding the areas to be excavated that may be impacted by the Work.
2. Location of test excavations.
3. Location of inspections.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to in this Section shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply:

A. OSHA Excavation Safety Standards, 29 CFR 1926, Subpart P

B. Florida Trench Safety Act (90-96, Laws of Florida)

C. American Society for Testing and Materials (ASTM)

1. ASTM D1556—Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.

2. ASTM D1557—Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).
3. ASTM D2937—Standard Test Method for Density of Soil in Place by the Drive-Cylinder Method.
4. ASTM D2487—Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
5. ASTM D3282—Standard Practice for Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes.
6. ASTM D3740—Standard Practice for Evaluation of Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used In Engineering Design and Construction.
7. ASTM D6938—Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
8. ASTM E329—Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.

D. American Wood Protection Association (AWPA)

1. AWPA C1—All Timber Products—Preservative Treatment by Pressure Processes.
2. AWPA C3—Piles – Preservative Treatment by Pressure Processes.

1.06 QUALITY ASSURANCE

A. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E329 to conduct soil materials and definition testing, as documented according to ASTM D3740.

B. The Contractor shall do the following:

1. Ensure that excavations provide adequate working space and clearance for the work to be performed and for installing piping and buried utilities. In no case shall excavation faces be undercut.
2. Ensure that foundation surfaces are clean and free of loose material of any kind when pipelines and buried utilities are placed on them.
3. Excavate, trench, and backfill in compliance with applicable requirements of governing authorities having jurisdiction.
4. Ensure that shoring and sheeting for excavations are designed by a Florida-registered Professional Engineer and are in accordance with the Occupational Safety and Health Administration (OSHA) Document 2226, *Safe Working Practices—Excavating and Trenching*.
5. Before beginning any excavation or grading, ensure the accuracy of all survey data indicated on the Contract Drawings and in these Specifications

and/or as provided. If the Contractor discovers any inaccuracies, errors, or omissions in the survey data, the Contractor shall immediately notify the Owner so that proper adjustments can be anticipated or ordered. If the Contractor begins any excavation or grading, this shall be considered an acceptance of the survey data by the Contractor, after which time the Contractor has no claim against the Owner resulting from alleged errors, omissions, or inaccuracies of the survey data.

6. Ensure that tolerances for excavation are ±0.10 foot to the required line and to the required grade. Tolerance for compaction of in-place material shall be ±0.10 foot to the required grade.
7. Ensure that all trench materials derived from the project site and imported to this site are examined, tested, and classified by an Engineer-approved soils testing laboratory.
8. Remove unsatisfactory materials and unsuitable materials including muck, silts, peat, and other loose and very loose compressible soils from excavations before placing pipe foundation, bedding, and buried utilities.

1.07 WARRANTIES

A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, for storing and protecting the items specified in this Section.

1.09 QUALIFICATIONS (NOT USED)

1.10 PROJECT CONDITIONS

A. Existing Utilities: The Contractor shall not interrupt utilities serving facilities occupied by the Owner or others unless permitted to do so in writing by the Engineer and then only after arranging to provide temporary utility services according to the requirements indicated.

1. Notify the Owner and Engineer not less than 2 days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without the Engineer’s written permission.
3. Verify utility locations for the Project Area before excavating.

1.11 DEFINITIONS

A. *Backfill*: Soil material or controlled low-strength material used to fill an excavation.

1. *Initial Backfill*: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. *Final Backfill*: Backfill placed over initial backfill to fill a trench.

B. *Base Course*: The course placed between the subbase course and hot-mix asphalt paving.

C. *Bedding Course*: The course placed over the excavated subgrade in a trench before laying pipe.

D. *Borrow Soil*: Satisfactory soil imported from off-site for use as fill or backfill.

E. *Drainage Course*: The course supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. *Excavation*: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. *Authorized Additional Excavation*: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by the Engineer. Authorized additional excavation and replacement material will be paid for according to the Contract provisions for unit prices.
2. *Bulk Excavation*: Excavation more than 10 feet in width and more than 30 feet in length.
3. *Unauthorized Excavation*: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by the Engineer. Unauthorized excavation, as well as remedial work directed by the Engineer, shall be without additional compensation.

G. *Fill*: Soil materials used to raise existing grades.

H. *Structures*: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

I. *Subgrade*: The surface or elevation remaining after completing excavation, or the top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

J. *Utilities*: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.12 TESTING REQUIREMENTS

A. The Contractor shall furnish a soil survey for satisfactory material and samples of materials.

B. Testing for source material, for classification, and for prequalification of material (on or off site) shall be performed by an independent testing agency retained by the Contractor and approved by the Engineer.

C. Testing for in-place compacted fill shall be performed by the same independent testing agency as approved by the Engineer and retained by the Contractor.

D. The number and location of the tests shall be as specified in these Specifications and as directed by the Engineer during construction.

E. The Contractor shall coordinate activity with the Engineer and the testing agency to permit testing as directed in the presence of the Engineer.

F. The cost of all testing to achieve specified requirements shall be borne by the Contractor.

G. The costs of any and all retests due to failure to achieve specified requirements shall be solely borne by the Contractor.

H. All materials proposed for use shall be tested as follows:

Material	Required Test	Min. No. Tests
Satisfactory Soil Materials	Soil Classification using ASTM D2487 (including all tests contained therein)	One per source of materials to determine conformance with materials specified in these Specifications; additional tests whenever there is any apparent change.
	Soil moisture-density relationship using Modified Proctor ASTM D1557	One per source of material or apparent change in material.

I. Soil materials shall be tested during construction as follows:

Material	Required Test	Min. No. Tests
Satisfactory Soil Material in-place after compaction	Field Density ASTM D1556 – Sand Cone Method, or ASTM D6938 – Nuclear Density Method, or ASTM D2937 – Drive Cylinder Method	For each layer of trench bottom subgrade before addition of soil materials, refill, bedding, and backfill, and for each 400 lineal feet of trench or fraction thereof, whichever is greater; two tests for each drainage, manhole, or wet well structure; additional test whenever there is any change in native soil, groundwater, or soil moisture conditions.

J. The approved testing agency shall transmit copies of required laboratory test results as follows:

1. One copy to the Owner.
2. Two copies to the Engineer.
3. Two copies to the Contractor.

The laboratory test reports shall include, at a minimum, project title; project location; location of sample; source, time, and date of testing; testing agency's name, address, and telephone number; and test results. Each test report shall be signed and sealed by the Professional Engineer representing the testing agency as specified in these Specifications.

K. The approved testing agency shall transmit copies of field testing results as follows:

1. One copy to the Owner.
2. Two copies to the Engineer.
3. Two copies to the Contractor.

The field test reports shall include, at a minimum, project title; project location; location of sample(s) tested; time of testing; date of testing; testing person's full name; testing agency name, address, and telephone number; and test results.

L. No soil material shall be used until 1) the Engineer has reviewed and approved test reports and 2) the Contractor submits certification that the soil material proposed for construction is clean and meets gradation and other parameters specified in these Specifications.

M. At no cost to the Owner, the Contractor shall remove and replace or correct all materials and work that tests indicate do not conform, in the opinion of the Engineer, to the requirements of these Specifications.

N. The results of in-place density tests shall be considered satisfactory if the density in each instance is equal to or greater than the specified density. Soil moisture content at the time of testing shall conform to requirements of these Specifications.

O. Where the tests reveal unsatisfactory compaction, the Contractor shall re-excavate, backfill, recompact, and/or rework the backfill as required to obtain the required degree of compaction over the entire depth of the excavation.

1.13 MAINTENANCE (NOT USED)

1.14 RECORD DRAWINGS (NOT USED)

PART 2 PRODUCTS

2.01 STRUCTURAL MATERIALS

A. Materials used for shoring and bracing, such as sheet piling, uprights, stringers, and crossbraces, shall be in good serviceable condition. Any timber used shall be sound and free from large or loose knots.

B. Pressure-treated timber shall be used where wood sheeting or piling is specified or indicated to be cut and left in place.

2.02 TRENCH SOIL MATERIALS

A. Materials used for trench construction shall be free of clumps of clay, rock or gravel, debris, waste, frozen materials, and other deleterious matter as determined by the Engineer and shall be satisfactory soil materials as follows:

Area Classification	Soil Materials
In excavations and trenches	Excavated and borrow material that has been sampled, tested, and approved as "Satisfactory Soil Material."

B. Satisfactory Soil Materials

1. Soil Classification Groups

Satisfactory soil materials for each trench shall be as follows:

Satisfactory Soil Material (ASTM D3282, Soil Classification Groups)		
In-situ Foundation	Bedding, Haunching, and Initial Backfill	Final Backfill
SW SP	SW SP	SW SP

2. Maximum Particle Size Limitations for Satisfactory Soil Materials

The maximum allowable particle size for satisfactory soil materials within each trench for each type of utility shall be as follows:

Conduit	Maximum Allowable Particle Size		
	In-situ Foundation	Bedding, Haunching, and Initial Backfill	Final Backfill
Ductile Iron Pipe	See Note 1	3/4 inch	3 inches
Other Conduit Materials	See Note 2	See Note 2	See Note 2

(1) There is no requirement when satisfactory undisturbed native soil material is used. Disturbed portions of the foundation and/or unsatisfactory native soil material shall be replaced with satisfactory soil materials meeting all the requirements for Bedding.
(2) The maximum allowable particle size shall be in accordance with the manufacturer's written recommendation.

3. Additional Requirements of Satisfactory Materials

Satisfactory soil materials shall be free of debris, waste, frozen materials, vegetation, or other deleterious matter. Soils within 4 inches of the exterior surface of the pipe shall be free of gravel, stones, or other materials that may abrade the pipe surface.

C. Unsatisfactory Materials

Unsatisfactory soil materials shall mean ASTM D2487, Soil Classification Groups GW, GP, GM, GC, SC, CL, ML, OL, CH, MH, OH, and PT and other highly organic soils and soil materials of any classification that have a moisture content at the time of compaction beyond the range of 1 percentage point below and 3 percentage points above the optimum moisture content of the soil material as determined by moisture-density relations test.

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

The Contractor shall do the following:

A. Carefully verify by hand methods the location of all surrounding underground utilities before performing utility excavations and trenches.

B. Protect utilities to be left in place from damage.

C. Do not interrupt existing utilities serving facilities occupied and used by the Owner, except when permitted in writing by the Owner.

D. Protect benchmarks, survey points, and existing structures, roads, sidewalks, monitoring wells, paving, curbs, etc., against damage from equipment, vehicular or foot traffic, settlement, lateral movement, undermining, washout, and all construction-related activities.

E. Repair and replace damage to existing facilities to equal or better than their original undamaged condition without cost to the Owner and to the approval of the Engineer.

F. Excavate and trench in ways that will prevent surface water and subsurface water from flowing into excavations and will also prevent flooding of the site and surrounding area.

G. Protect excavations and trenching by shoring, bracing, sheet piling, underpinning, or other methods as required to prevent cave-ins or loose dirt from falling into excavations and trenches.

H. Do not operate earth-moving equipment within 5 feet of walls of concrete structures for depositing or compacting backfill material.

I. Compact the backfill material placed next to concrete walls with hand-operated tampers or similar equipment that will not damage the structure.

J. Excavate, fill, backfill, and grade to elevations required by the Contract Documents.

K. Pile excavated materials suitable for backfill in an orderly manner a sufficient distance from excavations to prevent overloading, slides, and cave-ins.

L. Do not obstruct access ways, roadways, and plant facilities.

M. Dewater excavations and trenches as necessary.

N. Refer to the Contract Drawings for additional requirements related to earthwork and protection of existing features.

3.02 TRENCH EXCAVATION

A. Before excavating the trench, the Contractor shall prepare the surface including clearing and grubbing.

B. The Contractor shall be required to fully comply with all applicable OSHA Excavation Safety Standards and to abide by them as covered by the most current version of the Florida Trench Safety Act (90-96, Laws of Florida).

C. The Contractor shall ensure that mechanical equipment used for trench excavation shall be of a type, design, and construction and shall be so operated that conduit/utility, when accurately laid to specified alignment, will be centered in the trench with adequate clearance between the conduit/utility and sidewalls of the trench. Undercutting the trench sidewall to obtain clearance will not be permitted.

D. The Contractor shall not use mechanical equipment in locations where its operation would cause damage to trees, buildings, culverts, other existing property, utilities, structures, etc. above or below ground. In all such locations, the Contractor shall use hand excavating methods.

E. The Contractor shall cut trenches sufficiently wide to enable proper installation of services and to allow for testing and inspection. The Contractor shall also trim and shape trench bottoms and leave them free of irregularities, lumps, and projections. Trench width shall be excavated as specified on the Contract Drawings.

F. The Contractor shall construct trench walls so as to avoid side wall collapse or sloughing. Trenches shall be either braced or open construction in accordance with the Contract Documents. No separate payment will be made for any special procedure used in connection with the excavation.

G. Where sheeting and bracing are not required, the Contractor shall construct trench walls in the bottom of the excavation as vertical as possible to the maximum height allowable by OSHA. Trench walls above this height shall be sloped to guard against side wall collapse or sloughing as specified on the Contract Drawings.

H. Where sheeting and bracing are required, the sheeting and bracing system shall meet the requirements in these Specifications.

I. Excavations shall be to the design elevations shown on the Contract Drawings or as specified, unless unsatisfactory or unsuitable foundation materials are encountered in the bottom of the excavation. Where unsatisfactory or unsuitable foundation materials are encountered, this material shall be undercut and removed as indicated on the Contract Drawings and replaced with satisfactory soil material meeting all the requirements for Bedding. The lift thicknesses and compaction requirements for the replacement soil shall also meet the requirements for Bedding.

J. The Contractor shall be careful not to overexcavate except where necessary to remove unsatisfactory or unsuitable materials, irregularities, lumps, rock, and projections. Unnecessary overexcavation shall be replaced as specified in these Specifications at the Contractor's sole expense.

K. The Contractor shall accurately grade bedding soil materials at the bottoms of the trenches to provide uniform bearing and support for each section of conduit/utility at every point along its entire length except where it is necessary to excavate the bedding for conduit/utility bells (e.g., pipe bells), etc., or for proper sealing of conduit/utility joints. Abrupt changes in grade of the trench bottom shall be avoided.

L. The Contractor shall dig bell holes and depressions after the bedding has been graded to ensure that the conduit/utility rests on the prepared bedding for as much of its full length as practicable. Bell holes and depressions shall be only of such length, depth, and width as required to make the joint.

M. The Contractor shall do the following:

1. Pile all excavated material in a manner that will not endanger the work or erode the stormwater management facilities or water courses.
2. Avoid obstructing sidewalks, driveways, and plant facilities.
3. Leave hydrants, valve pit covers, valve boxes, or other utility controls unobstructed and accessible.
4. Keep gutters, drainage inlets, natural water courses, and miscellaneous drainage structures clear or make other satisfactory provisions for their proper operation.

N. The Contractor shall keep all satisfactory materials that are suitable for use/reuse in the trench construction separated from unsatisfactory materials.

O. Except where otherwise authorized, indicated, or specified, the Contractor shall replace, at the Contractor’s own expense, all materials excavated below the

bottom of concrete walls, footings, slabs on grade, and foundations with concrete or flowable fill, as directed by the Engineer.

P. The Contractor shall adhere to these Additional Excavation Requirements for piping:

1. Excavate trenches so that the piping can be laid to the lines, grades, and elevations indicated on the Contract Drawings.
2. For piping designated to be laid to a minimum cover requirement, grade trenches to avoid high and low points to the extent practical. Record Drawings of such pipes shall present top-of-pipe and grade elevations at all high and low points along each pipe segment, at the end points of each pipe segments, and at intervals not to exceed 50 feet along each pipe segment.
3. Minimum cover over the top of the pipe from finished grade for various pipe diameters shall be as shown on Contract drawings
   Continue dewatering operations along each pipe segment until the required minimum cover is provided. During the dewatering operations, the ground water level in the trench shall remain at all times a minimum of 1 foot below bottom of trench excavations.

Q. The Contractor shall adhere to this Additional Excavation Requirement for Appurtenances:

1. Ensure that excavations for valves and similar appurtenances shall be sufficient to leave at least 12 inches in the clear between the outer surfaces and the embankment or timber used to hold and protect the walls.

3.03 PROTECTION OF PERSONS AND PROPERTY

A. The Contractor shall do the following:

1. Barricade and post excavations with warning signs for the safety of persons. Provide warning lights during hours of darkness.
2. Protect structures, utilities, sidewalks, pavements, and other facilities immediately adjacent to excavations against damage including loading, settlement, lateral movement, undermining, and washout.

B. Conduct topsoil removal operations to ensure the safety of persons and to prevent damage to existing structures and utilities, construction in progress, trees and vegetation to remain standing, and other property.

3.04 SHEETING AND BRACING

A. Where sheeting and bracing are required to support the side walls of the excavation, the Contractor shall retain a Professional Engineer, registered in Florida, to design sheeting and bracing. The design shall establish requirements for sheeting and bracing and shall comply with all applicable codes; authorities having jurisdiction; and federal, state, and local regulations.

B. The sole responsibility for the design, methods of installation, and adequacy of sheeting and bracing shall be and shall remain that of the Contractor and the Contractor's Professional Engineer. The Contractor shall provide all necessary sheeting and bracing or other procedures as required to ensure safe working conditions and to protect the excavations.

C. Sheeting and bracing shall consist of braced steel sheet piling, trench box, braced wood lagging, and soldier beams or other approved methods.

D. The Contractor shall immediately fill and compact voids formed outside the sheeting. Where soil cannot be properly compacted to fill the void, the Contractor shall use Class B concrete as backfill at no additional cost to the Owner.

E. The Contractor shall install sheeting outside the required clearances and dimensions. Sheeting shall be plumb, securely braced, and tied in position. Sheeting shall be adequate to withstand all pressure to which it may be subjected. The Contractor shall correct any movement or bulging at no expense to the Owner so as to provide the necessary clearances and dimensions.

F. The Contractor shall maintain sheeting and bracing in excavations and trenches for the entire time excavations will be open.

G. The Contractor shall not brace sheeting against pipe being laid. Sheeting shall be braced so that no concentrated load of horizontal thrust is transmitted to the pipe.

H. Sheeting shall not be withdrawn if driven below the spring line of any pipe. The Contractor shall cut off tops as indicated on the Contract Drawings and leave bottoms permanently in place.

3.05 DEWATERING, WATER REMOVAL, AND DRAINAGE MAINTENANCE

A. Water shall not be permitted to accumulate in excavations. The Contractor shall provide dewatering systems to convey water away from excavations so that softening of foundations bottoms, footing undercutting, and soil changes detrimental to subgrade stability and foundation will not occur. Dewatering systems and methods of disposal shall be approved by the Engineer before being

installed by the Contractor. Groundwater levels shall be maintained a minimum of 1 foot below bottom of trenches or excavations.

B. Dewatering systems and equipment shall be in place as required to eliminate water during the excavation period until the work is completed. The Contractor shall provide ample means and equipment with which to remove promptly and dispose of properly all water entering any excavation. This includes the use of sand or gravel as required to maintain adequate flow during the pipe laying or installation of other items of work within the excavation.

C. Water pumped or drained shall be disposed of in a suitable manner without damage to adjacent property, to other work under construction, or to roads. Water shall not be discharged onto surface improvements without adequate protection of the surface at the point of discharge. All gutter, drains, culverts, sewers, and inlets shall be kept clean and open for surface drainage. Water shall not be directed across or over pavements except through approved pipes or properly constructed troughs. The Contractor shall obtain permission from the Owner of any property involved before constructing water courses or installing discharge pipe or hose for removal of water and provide for disposal of the water without ponding or creating a public nuisance.

D. All pumps used for dewatering shall have noise-reduction features and shall be able to run continuously with minimal attendance. If required by the Owner or Engineer, the pumps shall be enclosed on all sides with a plywood enclosure, with padded material suitable for outdoor conditions on the inside of the enclosure, to further reduce pump engine noise to an acceptable level. All applicable ordinances and codes for noise abatement shall be followed. The Contractor shall maintain pumps at all times, as necessary. When pumps are no longer required, the Contractor shall remove the pumps, wellpoints, pipes, and other apparatus from the area.

E. It is essential that the discharge of the trench dewatering pumps be conducted to natural drainage channels, drains, or storm sewers.

F. Trenches shall be constructed on the upstream side of the traffic way across roadways, driveways, or other traffic ways adjacent to drainage ditches or water to prevent impounding water after the pipe has been laid. The Contractor shall construct and maintain bridges and other temporary structures required to maintain traffic across such unfilled trenches. Backfilling shall be done so that water will not accumulate in unfilled or partially filled trenches. After backfilling is completed, the Contractor shall immediately remove all material deposited in roadway ditches or other water courses crossed by the line of trench and restore the original section, grades, and contours of ditches or water courses. Surface drainage shall not be obstructed longer than necessary.

G. Where trenches are constructed in ditches or other water courses, backfill shall be protected from surface erosion. Where the grade of the ditch exceeds 1%, the Contractor shall install ditch checks. Unless otherwise indicated on the Contract Drawings, ditch checks shall be concrete or as otherwise approved by the Engineer. Ditch checks shall extend not less than 2 feet below the original ditch or water course bottom for the full bottom width and at least 18 inches into the side slopes and shall be at least 12 inches thick.

3.06 BACKFILLING AND COMPACTION

A. The Contractor shall not backfill trenches until required tests are performed.

B. Trenches improperly backfilled shall be reopened to the depth required for proper compaction, then refilled and compacted as specified, or the condition shall be otherwise corrected as directed.

C. The Contractor shall perform the following steps to ensure compaction at the bottom of the trench or excavation before bedding:

1. Remove disturbed native soil material and/or any soils not meeting the requirement of satisfactory soil material as indicated on the Contract Drawings.
2. Compact the bottom of the trench excavation (undisturbed native subsurface soil) to no less than 95% of the Modified Proctor maximum dry density in accordance with ASTM D1557, before placement of foundation, bedding, piping, and backfill.

D. To backfill below and around pipe to the spring line of the pipe, the Contractor shall do the following:

1. Construct foundation and bedding as indicated on the Contract Drawings before placement of pipe.
2. Install each pipe at proper grade, alignment, and final position.
3. Deposit satisfactory soil material uniformly and simultaneously on each side of pipe in completed course layers to prevent lateral displacement.
4. Compact under pipe haunches and on each side of pipe to the pipe spring line as shown on the Contract Drawings to hold the pipe in the proper position during subsequent pipe backfilling and compaction operations.
5. Construct haunching as indicated on the Contract Drawings.

E. To trench backfill above pipe spring line to finished grade, the Contractor shall do the following:

1. Deposit satisfactory soil material around and above pipe in uniform layers as shown on the Contract Drawings.
2. Backfill and compact trenches from the spring line of the pipe to the top of the trench in completed course layers as shown on the Contract Drawings.
3. Use material previously defined in these Specifications as satisfactory soil material.
4. Compact by hand or mechanical tampers.

3.07 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. The Contractor shall remove and legally dispose of waste materials, including excavated material classified as unsatisfactory soil material, trash, and debris from the property at no additional cost to the Owner.

END OF SECTION

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SECTION 02370
EROSION AND SEDIMENTATION CONTROL

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall take every reasonable precaution throughout construction to prevent the erosion of soil and the sedimentation of streams, bays, storm systems, or other water impoundments, ground surfaces, or other property as required by federal, state, and local regulations.

B. The Contractor shall provide protective covering for disturbed areas upon suspension or completion of land-disturbing activities. Permanent vegetation shall be established at the earliest practicable time. Temporary and permanent erosion-control measures shall be coordinated to ensure economical, effective, and continuous erosion and siltation control throughout the construction and post-construction period.

1.02 RELATED WORK (NOT USED)

1.03 SUBMITTALS

A. The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to in this Section shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

A. Florida Department of Transportation (FDOT)

1. FDOT Section 104—Prevention, Control, and Abatement of Erosion and Water Pollution.

2. FDOT Section 985—Geotextile Fabrics.

1.06 QUALITY ASSURANCE (NOT USED)

1.07 WARRANTIES

A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, for storing and protecting the items specified in this Section.

1.09 QUALIFICATIONS (NOT USED)

1.10 TESTING REQUIREMENTS (NOT USED)

1.11 MAINTENANCE (NOT USED)

1.12 RECORD DRAWINGS (NOT USED)

1.13 REGULATORY REQUIREMENTS

A. The Contractor shall prevent damage to properties outside the construction limits from siltation due to construction of the project and assume all responsibilities to the affected property owners for correction of damages that may occur. Erosion-control measures shall be performed conforming to the requirements of and in accordance with plans approved by applicable state and local agencies and as specified by the erosion-control portion shown on the Drawings and as required by these Specifications. The Contractor shall not allow mud and debris to accumulate in the streets or enter drainage ditches, canals, or waterways. Should the Contractor pump water from excavations during construction, appropriate siltation preventative measures shall be taken before the pumped water is discharged into any drainage ditch, canal, or waterway.

1.14 PRACTICES

The Contractor shall adhere to the following:

A. Avoid dumping soil or sediment into any stream bed, pond, ditch, or watercourse.

B. Maintain an undisturbed vegetative buffer where possible between a natural watercourse and trenching and grading operations.

C. Avoid equipment crossings of streams, creeks, and ditches where practicable.

1.15 EROSION AND SEDIMENT-CONTROL DEVICES AND FEATURES

A. The Contractor shall construct all devices (silt fences, retention areas, etc.) for sediment control at the locations required to protect federal, state, and local water bodies and watercourses and drainage systems before beginning to excavate the site. All devices shall be properly maintained in place until a structure or paving makes the device unnecessary or until directed to permanently remove the device.

B. The Contractor shall use mulch to temporarily stabilize areas subject to excessive erosion and to protect seed beds after planting where required.

C. Filter fabric, synthetic bales, or other approved methods shall be placed and secured over the grates of each existing inlet, grating, or storm pipe opening near the area of excavation to prevent silt and debris from entering the storm systems.

D. The Contractor shall use silt fences, synthetic bales, and floating turbidity barriers as shown on the plans or as directed by the Owner or Owner's Representative to restrict movement of sediment from the site.

E. The Contractor shall establish vegetative cover on all unpaved areas disturbed by the work.

PART 2 PRODUCTS

2.01 GENERAL

A. Silt fence shall consist of non-biodegradable filter fabric (Trevira, Mirafi, etc.), in accordance with FDOT Section 985, wired to galvanized wire mesh fencing and supported by wood or metal posts.

B. Floating or staked turbidity barriers as specified in FDOT Section 985 and FDOT Standard Index 103.

C. Erosion Stone: FDOT Section 530.

1. Sand-Cement Riprap.
2. Concrete Block.
3. Rubble 20 to 300 pounds each.

D. Filter Fabric for placing under Riprap shall meet the requirements of FDOT Section 985.

E. Sediment barriers in accordance with FDOT Section 104.

PART 3 EXECUTION

3.01 CLEARING

A. The Contractor shall schedule and perform clearing and grubbing so that subsequent grading operation and erosion-control practices can follow immediately after. Excavation, borrow, and embankment operations will be conducted as a continuous operation. All construction areas not otherwise protected shall be planted with permanent vegetative cover within 30 working days after completing active construction.

3.02 STABILIZING

A. The angle for graded slopes and fills shall be no greater than the angle that can be retained by vegetative cover or other adequate erosion-control devices or structures. All disturbed areas outside of embankment left exposed will, within 30 working days of completion of any phase of grading, be sodded or otherwise provided with either temporary or permanent ground cover, devices, or structures sufficient to restrain erosion.

3.03 REGULATORY REQUIREMENTS

A. Whenever land-disturbing activity is undertaken on a tract, a ground cover sufficient to restrain erosion must be sodded or otherwise provided within 30 working days on that portion of the tract upon which further active construction is to be undertaken.

B. If any earthwork is to be suspended for any reason for longer than 30 calendar days, the areas involved shall be sodded with vegetative cover or otherwise protected against excessive erosion during the suspension period. Suspension of work in any area of operation does not relieve the Contractor of the responsibility to control erosion in that area.

3.04 VEGETATIVE COVER

A. Disturbed areas shall be restored in kind.

3.05 MAINTENANCE

A. The Contractor shall maintain all temporary and permanent erosion-control measures in functioning order. Temporary structures shall be maintained until such time as vegetation is firmly established and grassed areas shall be maintained until completion of the project. Areas which fail to show a suitable stand of grass or which are damaged by erosion shall be immediately repaired. No additional payment will be made to the Contractor for re-establishing erosion-control devices, which may become damaged, destroyed, or otherwise rendered unsuitable for their intended function during the construction of the project.

B. The Contractor shall remove all silt, sediment, and debris buildup regularly to maintain functioning storm systems and erosion-control devices.

3.06 REMOVAL OF SEDIMENT CONTROL DEVICES

A. Near completion of the project, when directed by the Engineer, the Contractor shall dismantle and remove the temporary devices used for sediment control during construction. All erosion-control devices in seeded areas shall be left in place until the grass is established. The Contractor shall seed areas around devices and mulch after removing or filling temporary control devices.

B. The Contractor shall clean up all areas at the completion of the project.

END OF SECTION

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SECTION 02531
CONNECTIONS TO AND WORK ON THE EXISTING SYSTEM

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, and equipment required and maintain operations, construct and maintain all temporary connections and bypasses, and construct the permanent connections to the new system as shown on the Drawings and as directed by the Engineer.

B. The Contractor shall furnish all labor, materials, and equipment required to tap the existing pipeline and install new pipeline as shown on Drawings and complete all additional work as required.

C. Notify the Engineer immediately of any discrepancies in elevations of existing pipes and structures between those shown on the Drawings and those established during construction so the Engineer can make the necessary modifications.

D. All new pipe for connection shall conform to the following specifications:

1. Section 15155, Ductile Iron Pipe and Fittings.

1.02 RELATED WORK

A. Section 01740, Final Cleaning.
B. Section 02532, Maintenance of Flow in Existing Sewers.

1.03 SUBMITTALS (NOT USED)

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS (NOT USED)

1.06 QUALITY ASSURANCE (NOT USED)

1.07 WARRANTIES

A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, for storing and protecting the items specified in this Section.

1.09 QUALIFICATIONS (NOT USED)

1.10 TESTING REQUIREMENTS (NOT USED)

1.11 MAINTENANCE (NOT USED)

1.12 RECORD DRAWINGS (NOT USED)

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 HANDLING WASTEWATER FLOWS

A. The Contractor shall furnish all labor, equipment, and materials necessary to maintain existing flows, including temporary bypasses and all pumping of wastewater that may be required to prevent backing up of sewers and shall immediately cart away and remove all offensive matter at the Contractor's own expense.

B. Submit to the Engineer and the Owner, for approval, a detailed written plan of procedures for flow maintenance 10 days in advance of flow interruption.

C. The Contractor shall make provisions to maintain sewer service connections during construction. Any damaged service connection shall be replaced from the main pipeline to a minimum of 3 feet beyond the point of damage.

END OF SECTION

SECTION 02532
MAINTENANCE OF FLOW IN EXISTING SEWERS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall be responsible for maintaining wastewater flow during construction. The wastewater treatment facility headworks shall remain in service and accessible at all times during construction.

B. Provide all labor, equipment, power, and materials necessary to maintain flow through the existing headworks. Construct and maintain all temporary bypasses and be responsible for all bypasses that may be required to prevent backing up of sewage during installation of all new pipe and to allow proper inspection and testing of the new work. The Contractor shall immediately remove and properly dispose of all offensive matter spilled during the bypass pumping at his own expense. Note that some pipes may have a continuous base flow, which must be handled.

C. The Contractor shall repair at his own expense any damage to property caused by his operations.

D. The Contractor shall maintain sewer flow around the work area in a manner that will not cause surcharging of sewers or damage to sewers and that will protect public and private property from damage and flooding.

E. If damage of any kind occurs to the existing sewers, the Contractor shall at his own expense make repairs to the satisfaction of the Engineer.

F. Work area open trenches for sewer pipe shall not be used for bypassing flows unless otherwise directed by the Engineer.

G. Sewage shall be bypassed only to existing sewers, as directed by the Engineer.

H. The Contractor is responsible for locating any existing utilities in the area the Contractor selects to locate the bypass pipeline. The Contractor shall locate his bypass pipelines to minimize any disturbances to existing utilities and shall obtain approval of the pipeline locations from the Owner and the Engineer. The Contractor shall pay all costs associated with relocating utilities and obtaining all approvals.

I. Upon completion of the bypass operations and after the receipt of written permission from the Engineer, the Contractor shall remove all the piping, restore all property to pre-construction condition. The Contractor is responsible for obtaining any approvals from the Owner for placing the temporary pipeline within public ways.

1.02 RELATED WORK

A. Section 01330, Submittals and Acceptance.
B. Section 02531, Connections To and Work On the Existing System.

1.03 SUBMITTALS

The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance:

A. All procedures for maintaining flows must meet the approval of the Engineer and the Contractor shall be required to submit to the Engineer, for approval, a detailed written plan of all methods of flow maintenance 10 days in advance of flow interruption, in accordance with Section 01330, Submittals and Acceptance.

B. The plan shall include but not be limited to details of the following:

1. Number, size, material, location, and method of installing suction piping.
2. Number, size, material, method of installation, and location of installations of discharge piping.
3. Schedule for installing and maintaining bypass lines.
4. Plan indicating location of bypass lines.

1.04 REFERENCE STANDARDS (NOT USED)

1.05 QUALITY ASSURANCE (NOT USED)

1.06 WARRANTIES

A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Section 01780, Warranties and Bonds.

1.07 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, for storing and protecting the items specified in this Section.

1.08 QUALIFICATIONS (NOT USED)

1.09 TESTING REQUIREMENTS (NOT USED)

1.10 MAINTENANCE (NOT USED)

1.11 RECORD DRAWINGS (NOT USED)

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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CONCRETE

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SECTION 03100
CONCRETE FORMWORK

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment, and incidentals required to design, install, and remove formwork for cast-in-place concrete complete as shown on the Drawings and specified herein.

B. Secure to forms as required or set for embedment as required, all miscellaneous metal items, sleeves, reglets, anchor bolts, inserts, and other items furnished under other sections and required to be cast into concrete, or approved in advance by the Engineer.

1.02 RELATED WORK

A. Section 03200, Concrete Reinforcement.
B. Section 03250, Concrete Joints and Joint Accessories.
C. Section 03300, Cast-In-Place Concrete.
D. Section 03600, Grout.

1.03 SUBMITTALS

The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance:

A. Submit shop drawings and product data showing materials of construction and details of installation for:

1. Form release agent.
2. Form ties.
3. Tapered ties: Proposed method and products for sealing form tie hole.

B. Samples

1. Demonstrate to the Engineer on a designated area of the concrete substructure exterior surface that the form release agent will not adversely affect concrete surfaces to be painted, coated, or otherwise finished and will not affect the forming materials.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to herein shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

A. American Concrete Institute (ACI)

1. ACI 301—Standard Specification for Structural Concrete.
2. ACI 318—Building Code Requirements for Reinforced Concrete.
3. ACI 347—Formwork for Concrete.

B. American Plywood Association (APA)

1. Material grades and designations as specified.

C. NSF International (NSF) / American National Standards Institute (ANSI)

1. NSF/ANSI 61—Drinking Water System Components – Health Effects.

1.06 QUALITY ASSURANCE (NOT USED)

1.07 WARRANTIES (NOT USED)

1.08 DELIVERY, STORAGE, AND HANDLING (NOT USED)

1.09 QUALIFICATIONS (NOT USED)

1.10 TESTING REQUIREMENTS (NOT USED)

1.11 WEATHER CONSTRAINTS (NOT USED)

1.12 SYSTEM DESCRIPTION

A. Formwork shall be designed and erected in accordance with the requirements of ACI 301 and ACI 318 and as recommended in ACI 347 and shall comply with all applicable regulations and codes. The design shall consider any special requirements due to the use of plasticized and/or retarded set concrete. Design forms and ties to withstand concrete pressures without budging, spreading, or lifting forms.

B. Architectural Concrete is wall, slab, beam, or column concrete which will have surfaces exposed to view in the finished work. It includes similar exposed surfaces in water containment structures from the top of walls to 2 feet below the normal water surface in open tanks and basins.

PART 2 PRODUCTS

2.01 GENERAL

A. The usage of a manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configurations desired.

2.02 MATERIALS

A. General: Forms for cast-in-place concrete shall be made of wood, metal, or other approved material. Construct wood forms of sound lumber or plywood of suitable dimensions and free from knotholes and loose knots. Where used for exposed surfaces, dress and match boards. Sand plywood smooth and fit adjacent panels with tight joints. Metal forms may be used when approved by the Engineer and shall be of an appropriate type for the class of work involved. All forms shall be designed and constructed to provide a flat, uniform concrete surface requiring minimal finishing or repairs.

B. Form Release Agent

1. Coat all forming surfaces in contact with concrete using an effective, non-staining, non-residual, water based, bond-breaking form coating unless otherwise noted. Form release agents used in potable water containment structures shall be suitable for use in contact with potable water and shall be non-toxic and free of taste or odor and meet the requirements of NSF/ANSI 61. Form release agent shall be Farm Fresh by Unitex or Engineer approved equal.

C. Form Ties

1. Form ties encased in concrete other than those specified in the following paragraphs shall be designed so that, after removal of the projecting part, no metal shall remain within 1-1/2 inches of the face of the concrete. The part of the tie to be removed shall be at least 1/2-inch diameter or be provided with a wood or metal cone at least 1/2-inch diameter and 1-1/2 inches long. Form ties in concrete exposed to view shall be the cone washer type.
2. Common wire shall not be used for form ties.

3. Alternate form ties consisting of tapered through-bolts at least 1 inch in diameter at smallest end or through-bolts that use a removable tapered sleeve of the same minimum size may be used at the Contractor's option. Obtain Engineer's acceptance of system and spacing of ties before ordering or purchase of forming. Clean, fill, and seal form tie hole with non-shrink cement grout. A vinyl plug shall be inserted into the hole to serve as a waterstop. The Contractor shall be responsible for water-tightness of the form ties and any repairs needed.

PART 3 EXECUTION

3.01 GENERAL

A. Forms shall be used for all cast-in-place concrete including sides of footings. Forms shall be constructed and placed so that the resulting concrete will be of the shape, lines, dimensions, and appearance indicated on the Drawings.

B. Molding, bevels, or other types of chamfer strips shall be placed to produce block outs, rustications, or chamfers as shown on the Drawings or as specified herein. Chamfer strips shall be provided at horizontal and vertical projecting corners to produce a 3/4 inch chamfer. Rectangular or trapezoidal moldings shall be placed in locations requiring sealants where specified or shown on the Drawings. Sizes of moldings shall conform to the sealants manufacturer's recommendations.

C. Forms shall be sufficiently rigid to withstand construction loads and vibration and to prevent displacement or sagging between supports. Construct forms so that the concrete will not be damaged by their removal. The Contractor shall be entirely responsible for the adequacy of the forming system.

D. Before form material is re-used, all surfaces to be in contact with concrete shall be thoroughly cleaned, all damaged places repaired, all projecting nails withdrawn, and all protrusions smoothed. Reuse of wooden forms for other than rough finish will be permitted only if a "like new" condition of the form is maintained.

3.02 FORM TOLERANCES

A. Forms shall be surfaced, designed, and constructed in accordance with the recommendations of ACI 347 and shall meet the following additional requirements for the specified finishes:

1. Formed Surface Exposed to View: Edges of all form panels in contact with concrete shall be flush within 1/16 inch and forms for plane surfaces shall be such that the concrete will be plane within 3/16 inch in 4 feet. Forms shall be tight to prevent the passage of mortar, water, and grout. The

maximum deviation of the finish wall surface at any point shall not exceed 1/4 inch from the intended surface as shown on the Drawings. Form panels shall be arranged symmetrically and in an orderly manner to minimize the number of seams.

2. Formed surfaces not exposed to view or buried shall meet requirements of Class "C" Surface in ACI 347.
3. Formed rough surfaces including mass concrete, pipe encasement, electrical duct encasement, and other similar installations shall have no minimum requirements for surface smoothness and surface deflections. The overall dimensions of the concrete shall be plus or minus 1 inch.

3.03 FORM PREPARATION

A. Wood forms in contact with the concrete shall be coated with an effective release agent before form installation.

B. Steel forms shall be thoroughly cleaned and mill scale and other ferrous deposits shall be sandblasted or otherwise removed from the contact surface for all forms, except those used for surfaces receiving a rough finish. All forms shall have the contact surfaces coated with a release agent.

3.04 REMOVAL OF FORMS

A. The Contractor shall be responsible for all damage resulting from removal of forms. Forms and shoring for structural slabs or beams shall remain in place in accordance with ACI 301 and ACI 347. Form removal shall conform to the requirements specified in Section 03300, Cast-In-Place Concrete, including curing requirements.

B. Repair all damages resulting from removal of forms.

C. Clean, fill, and seal form tie hole with non-shrink cement grout. The Contractor shall be responsible for the watertightness of the form ties holes and any repair necessary to maintain watertightness of tie holes.

3.05 INSPECTION

A. The Engineer on site shall be notified when the forms are complete and ready for inspection at least 6 hours before the proposed concrete placement.

B. Failure of the forms to comply with the requirements specified herein or to produce concrete complying with the requirements of Section 03300, Cast-In-Place Concrete, shall be grounds for rejection of that portion of the concrete work. Rejected work shall be repaired or replaced as directed by the Engineer at no

additional cost to the Owner. Such repair or replacement shall be subject to the requirements to this Section and approval of the Engineer.

END OF SECTION

SECTION 03200
CONCRETE REINFORCEMENT

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment, and incidentals required and install all concrete reinforcement complete as shown on the Drawings and as specified herein.

1.02 RELATED WORK

A. Section 03100, Concrete Formwork.
B. Section 03300, Cast-In-Place Concrete.

1.03 SUBMITTALS

The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance:

A. Submit shop drawings and product data showing materials of construction and details of installation for:

1. Reinforcing steel. Placement Drawings shall conform to the recommendations of the CRSI Manual of Standard Practice and ACI SP-66. All reinforcement in a concrete placement shall be included on a single Placement Drawing or cross-referenced to the pertinent main Placement Drawing. The main Drawing shall include the additional reinforcement (around openings, at corners, etc.) shown on the standard detail sheets. Bars to have special coatings and/or to be of special steel or special yield strength are to be clearly identified. For all cast-in-place concrete tanks, retaining walls, building stem walls, wall sections shall be included in the Drawings.
2. All splice and joint locations shall be indicated on Placement Drawings. Splice lengths shall be clearly dimensioned.
3. Reinforcement cover shall be clearly indicated.
4. Submit reinforcement shop drawing for each structure as a complete package. Submittal showing portions of a structure will not be acceptable, unless accepted by the Engineer in advance.
5. Submittals consisting of schedules without accompanying Placement Drawings will not be acceptable, unless accepted by the Engineer in advance.

6. Bar bending details. The bars shall be referenced to the same identification marks shown on the Placement Drawings and shipping tags. Schedules shall be located on the same sheet where the bar mark is referenced. Schedule of all placements to contain synthetic reinforcing fibers. The amount of fibers per cubic yard to be used for each of the placements shall be noted on the schedule. The name of the manufacturer of the fibers and the product data shall be included with the submittal.

B. Test Reports

1. Certified copy of mill test on each steel proposed for use showing the physical properties of the steel and the chemical analysis.
2. Mechanical Reinforcing Bar Couplers: Current Evaluation Report prepared by ICC-ES or by other approved testing agency.

C. Certificates

1. Welder's certification. The certification shall be in accordance with AWS D1.4 when welding of reinforcement is required.
2. Weld Procedures: Provide procedure for each type of welded reinforcing splice in accordance with AWS D1.4 when welding of reinforcing is required.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to herein shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

A. American Concrete Institute (ACI)

1. ACI 301—Standard Specification for Structural Concrete.
2. ACI 315—Details and Detailing of Concrete Reinforcement.
3. ACI 318—Building Code Requirements for Structural Concrete.
4. ACI SP-66—ACI Detailing Manual.

B. American Society for Testing and Materials (ASTM)

1. ASTM A82—Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
2. ASTM A184—Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement.

3. ASTM A615—Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
4. ASTM A616—Standard Specification for Rail-Steel Deformed and Plain Bars for Concrete Reinforcement.
5. ASTM A617—Standard Specification for Axle-Steel Deformed and Plain Bars for Concrete Reinforcement.
6. ASTM A704—Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement.
7. ASTM A706—Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement.
8. ASTM A767—Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
9. ASTM A775—Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
10. ASTM A884—Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement.
11. ASTM A934—Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars.
12. ASTM A1064—Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

C. American Welding Society (AWS)

1. AWS D1.4—Structural Welding Code Reinforcing Steel.

D. Concrete Reinforcing Steel Institute (CRSI)

1. Manual of Standard Practice.

E. International Code Council (ICC)

1. ICC-ES—ICC Evaluation Service.

1.06 QUALITY ASSURANCE

A. Provide services of a manufacturer's representative, with at least 2 years of experience in the use of the reinforcing fibers for a preconstruction meeting and assistance during the first placement of the material.

1.07 WARRANTIES (NOT USED)

1.08 DELIVERY, STORAGE, AND HANDLING

A. Reinforcing steel shall be substantially free from mill scale, rust, dirt, grease, or other foreign matter.

B. Reinforcing steel shall be shipped and stored with bars of the same size and shape fastened in bundles with durable tags, marked in a legible manner with waterproof markings showing the same "mark" designations as those shown on the submitted Placement Drawings.

C. Reinforcing steel shall be stored off the ground and kept free from dirt, oil, or other injurious contaminants

1.09 QUALIFICATIONS (NOT USED)

1.10 TESTING REQUIREMENTS (NOT USED)

1.11 WEATHER CONSTRAINTS (NOT USED)

PART 2 PRODUCTS

2.01 MATERIALS

A. Materials shall be new, of domestic manufacture, and shall comply with the following material specifications.

B. Deformed Concrete Reinforcing Bars: ASTM A615, Grade 60 deformed bars.

C. Concrete Reinforcing Bars required on the Drawings to be Welded: ASTM A706.

D. Welded Steel Wire Fabric: ASTM A1064. Provide in flat sheets.

E. Welded Deformed Steel Wire Fabric: ASTM A497. Provide in flat sheets.

F. Welded Plain Bar Mats: ASTM A704 and ASTM A615 Grade 60 plain bars.

G. Fabricated Deformed Steel Bar Mats: ASTM A184 and ASTM A615 Grade 60 deformed bars.

H. Reinforcing Steel Accessories:

1. Plastic Protected Bar Supports: CRSI Bar Support Specifications, Class 1 - Maximum Protection.
2. Stainless Steel Protected Bar Supports: CRSI Bar Support Specifications, Class 2 - Moderate Protection.
3. Precast Concrete Block Bar Supports: CRSI Bar Support Specifications, Precast Blocks. Blocks shall have equal or greater strength than the surrounding concrete.
4. Steel Protected Bar Supports: #4 Steel Chairs with plastic or rubber tips.

I. Tie Wire: Tie Wires for Reinforcement shall be 16-gauge or heavier, black annealed wire or stranded wire.

2.02 FABRICATION

A. Fabrication of reinforcement shall be in compliance with the CRSI Manual of Standard Practice and ACI SP-66.

B. Bars shall be cold bent. Bars shall not be straightened or rebent.

C. Bars shall be bent around revolving collar having a diameter of not less than that recommended by the ACI SP-66.

D. Bar ends that are to be butt spliced, placed through limited diameter holes in metal, or threaded, shall have the applicable end(s) saw-cut. Such ends shall terminate in flat surfaces within 1-1/2 degrees of a right angle to the axis of the bar.

PART 3 EXECUTION

3.01 INSTALLATION

A. Surface condition, bending, spacing and tolerances of placement of reinforcement shall comply with the CRSI Manual of Standard Practice and ACI SP-66. The Contractor shall be solely responsible for providing and adequate number of bars and maintaining the spacing and clearances shown on the Drawings.

B. Except as otherwise indicated on the Drawings, the minimum concrete cover of reinforcement shall be as follows:

1. Concrete cast against and permanently exposed to earth: 3 inches.
2. Concrete exposed to soil, water, sewage, sludge, and/or weather: 2 inches (including bottom cover of slabs over water or sewage).

C. Reinforcement which will be exposed for a considerable length of time after being placed shall be coated with a heavy coat of neat cement slurry.

D. No reinforcing steel bars shall be welded either during fabrication or erection unless specifically shown on the Drawings or specified herein, or unless prior written approval has been obtained from the Engineer. All bars that have been welded, including tack welds, without such approval shall be immediately removed from the work. When welding of reinforcement is approved or called for, it shall comply with AWS D1.4.

E. Reinforcing steel interfering with the location of other reinforcing steel, conduits, or embedded items, may be moved within the specified tolerances or one bar diameter, whichever is greater. Greater displacement of bars to avoid interference shall only be made with the approval of the Engineer. Do not cut reinforcement to install inserts, conduits, mechanical openings, or other items without the prior approval of the Engineer.

F. Securely support and tie reinforcing steel to prevent movement during concrete placement. Secure dowels in place before placing concrete.

G. Reinforcing steel bars shall not be field-bent except where shown on the Drawings or specifically authorized in writing by the Engineer. If authorized, bars shall be cold-bent around the standard diameter spool specified in the CRSI. Do not heat bars. Closely inspect the reinforcing steel for breaks. If the reinforcing steel is damaged, replace, Cadweld, or otherwise repair as directed by the Engineer. Do not bend reinforcement after it is embedded in concrete unless specifically shown otherwise on the Drawings.

3.02 REINFORCEMENT AROUND OPENINGS

A. Unless specific additional reinforcement around openings is shown on the Drawings, provide additional reinforcing steel on each side of the opening equivalent to one-half of the cross-sectional area of the reinforcing steel interrupted by an opening. The bars shall have sufficient length to develop bond at each end beyond the opening or penetration.

3.03 SPLICING OF REINFORCEMENT

A. Splices designated as compression splices on the Drawings, unless otherwise noted, shall be 30-bar diameters, but not less than 12 inches. The lap splice length for column vertical bars shall be based on the bar size in the column above.

B. Tension lap splices shall be provided at all laps in compliance with ACI SP-66. Splices in adjacent bars shall be staggered. Class A splices may be used when 50 percent or less of the bars are spliced within the required lap length. Class B splices shall be used at all other locations.

C. Splicing of reinforcing steel in concrete elements noted to be "tension members" on the Drawings shall be avoided whenever possible. However, if required for constructability, splices in the reinforcement subject to direct tension shall be welded to develop, in tension, at least 125% of the specified yield strength of the bar. Splices in adjacent bars shall be offset the distance of a Class B splice.

D. Install wire fabric, in locations shown on the Drawings, in as long lengths as practicable. Wire fabric from rolls shall be rolled flat and firmly held in place. Splices in welded wire fabric shall be lapped in accordance with the requirements of ACI SP-66 but not less than 12 inches. The spliced fabrics shall be tied together with wire ties spaced not more than 24 inches on center and laced with wire of the same diameter as the welded wire fabric. Do not position laps midway between supporting beams, or directly over beams of continuous structures. Offset splices in adjacent widths to prevent continuous splices.

E. Mechanical reinforcing steel splicers shall be used only where shown on the Drawings. Splices in adjacent bars shall be offset by at least 30-bar diameters. Mechanical reinforcing splices are only to be used for special splice and dowel conditions approved by the Engineer.

3.04 ACCESSORIES

A. Determine, provide, and install accessories such as chairs, chair bars, and the like in sufficient quantities and strength to adequately support the reinforcement and prevent its displacement during the erection of the reinforcement and the placement of concrete.

B. Use precast concrete blocks where the reinforcing steel is to be supported over soil.

C. Stainless steel bar supports or steel chairs with stainless steel tips shall be used where the chairs are set on forms for a concrete surface that will be exposed to weather, high humidity, or liquid (including bottom of slabs over liquid containing areas). Use of galvanized or plastic tipped metal chairs is permissible in all other locations unless otherwise noted on the Drawings or specified herein.

D. Alternate methods of supporting top steel in slabs, such as steel channels supported on the bottom steel or vertical reinforcing steel fastened to the bottom and top mats, may be used if approved by the Engineer.

3.05 INSPECTION

A. In no case shall any reinforcing steel be covered with concrete until the installation of the reinforcement, including the size, spacing, and position of the reinforcement, has been observed by the Engineer and the Engineer's release to proceed with the concreting has been obtained. The Engineer shall be given ample prior notice of the readiness of placed reinforcement for observation. The forms shall be kept open until the Engineer has finished his/her observations of the reinforcing steel.

END OF SECTION

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SECTION 03250
CONCRETE JOINTS AND JOINT ACCESSORIES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment, and incidentals required and install accessories for concrete joints as shown on the Drawings and as specified herein.

1.02 RELATED WORK

A. Section 03100, Concrete Formwork.
B. Section 03200, Concrete Reinforcement.
C. Section 03300, Cast-In-Place Concrete.
D. Section 03360, Concrete Finishes.
E. Section 03600, Grout.

1.03 SUBMITTALS

The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance:

A. Submit shop drawings and product data. Submittals shall include at least the following:

1. Premolded Joint Fillers: Product data including catalogue cut, technical data, storage requirements, installation requirements, location of use, and conformity to ASTM standards.
2. Bond Breaker: Product data including catalogue cut, technical data, storage requirements, installation requirements, location of use, and conformity to ASTM standards.
3. Expansion Joint Dowels: Product data on the complete assembly including dowels, coatings, lubricants, spacers, sleeves, expansion caps, installation requirements, and conformity to ASTM standards.
4. Compressible Joint Filler: Product data including catalogue cut, technical data, storage requirements, installation requirements, location of use, and conformity to ASTM standards.
5. Bonding Agents: Product data including catalogue cut, technical data, storage requirements, product life, application requirements, and conformity to ASTM standards.

B. Certifications

1. Certification that all materials used within the joint system is compatible with each other.
2. Certifications that materials used in the construction of joints are suitable for use in contact with potable water 30 days after installation.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to herein shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

A. American Society for Testing and Materials (ASTM)

1. ASTM A675—Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties.
2. ASTM C881—Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
3. ASTM C1059—Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete.
4. ASTM D570—Standard Test Method for Water Absorption of Plastics.
5. ASTM D624—Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
6. ASTM D638—Standard Test Method for Tensile Properties of Plastics.
7. ASTM D746—Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.
8. ASTM D747—Standard Test Method for Apparent Bending Modulus of Plastics by Means of a Cantilever Beam.
9. ASTM D792—Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
10. ASTM D1751—Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
11. ASTM D1752—Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

B. US Army Corps of Engineers (CRD)

1. CRD-C572—Specification for Polyvinylchloride Waterstops.

C. Federal Specifications (FS)

1. FS SS-S-210A—Sealing Compound for Expansion Joints.

1.06 QUALITY ASSURANCE (NOT USED)

1.07 WARRANTIES (NOT USED)

1.08 DELIVERY, STORAGE, AND HANDLING (NOT USED)

1.09 QUALIFICATIONS (NOT USED)

1.10 TESTING REQUIREMENTS (NOT USED)

1.11 WEATHER CONSTRAINTS (NOT USED)

PART 2 PRODUCTS

2.01 GENERAL

A. The use of manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configuration desired.

B. All materials used together in a given joint (bond breakers, backer rods, joint fillers, sealants, etc.) shall be compatible with one another. Coordinate selection of suppliers and product to ensure compatibility. Under no circumstances shall asphaltic bond breakers or joint fillers be used in joints receiving sealant.

2.02 MATERIALS

A. Expansion Joint Material

1. Joint Material at structures: Self-expanding cork, premolded joint filler shall conform to ASTM D1752, Type III. The thickness shall be 3/4 inch unless shown otherwise on the Drawings.
2. Joint Material at sidewalk and roadway concrete pavements or where fiber joint filler is specifically noted on the Drawings: The joint filler shall be asphalt-impregnated fiber board conforming to ASTM D1751. Thickness shall be 3/4 inch unless otherwise shown on the Drawings.

B. Bond Breaker

1. Bond breaker tape shall be an adhesive-backed glazed butyl or polyethylene tape which will satisfactorily adhere to the premolded joint

filler or concrete surface as required. The tape shall be the same width as the joint.

2. Except where tape is specifically called for on the Drawings, bond breaker for concrete shall be either bond breaker tape or a nonstaining type bond prevention coating such as Maxi-Tilt with Dye by Dayton Superior, Inc.; Silcoseal 77, by SCA Construction Supply Division, Superior Concrete Accessories or equal.

C. Expansion Joint Dowels

1. Dowels shall be smooth steel conforming to ASTM A675, Grade 70. Dowels must be straight and clean, free of loose flaky rust and loose scale. Dowels may be sheared to length provided deformation from true shape caused by shearing does not exceed 0.04 inch on the diameter of the dowel and extends no more than 0.04 inch from the end. Bars shall be coated with a bond breaker on the expansion end of the dowel. Expansion caps shall be provided on the expansion end. Caps shall allow for at least 1-1/2 inches of expansion.
2. Dowel Bar Sleeves: Provide two component Speed Dowel System by Sika, to accept 1-inch-diameter x 12-inch-long slip dowels. Speed Dowel System is comprised of a reusable base and a plastic sleeve. Both pieces shall be manufactured from polypropylene plastic.

D. Bonding Agent

1. Epoxy bonding agent shall be a two-component, solvent-free, moisture insensitive, epoxy resin material conforming to ASTM C881, Type II. The bonding agent shall be Sikadur 32 Hi-Mod by Sika Corporation of Lyndhurst, N.J.; MasterEmaco ADH 326 by BASF or equal. Acrylic may be used if approved by the Engineer.

E. Compressible Joint Filler

1. The joint filler shall be a non-extruded watertight strip material use to fill expansion joints between structures. The material shall be capable of being compressed at least 40% for 70 hours at 68 degrees F and subsequently recovering at least 20% of its original thickness in the first 1/2 hour after unloading. Compressible Joint filler shall be Wabo®Evasote, by BASF, Inc., or equal.

F. Joint Sealant

1. The joint sealant shall be a one-component, polyurethane-based, non-sag elastomeric sealant. Joint sealant shall be Sikaflex-1a or equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. Construction Joints

1. Make construction joints only at locations shown on the Drawings or as approved by the Engineer. Any additional or relocation of construction joints proposed by the Contractor must be submitted to the Engineer for written approval. Joints shall be spaced at a maximum of 40 feet o.c. unless noted otherwise on the Drawings.
2. Additional or relocated joints should be located where they least impair strength of the member. In general, locate joints within the middle third of spans of slabs, beams, and girders. However, if a beam intersects a girder at the joint, offset the joint a distance equal to twice the width of the member being connected. Locate joints in walls and columns at the underside of floors, slabs, beams, or girders and at tops of footings or floor slabs. Do not locate joints between beams, girders, column capitals, or drop panels and the slabs above them. Do not locate joints between brackets or haunches and walls or columns supporting them.
3. All joints shall be perpendicular to main reinforcement. Continue reinforcing steel through the joint as indicated on the Drawings. When joints in beams are allowed, provide a shear key and inclined dowels as approved by the Engineer.
4. Provide sealant grooves for joint sealant where indicated on the Drawings.
5. At all construction joints and at concrete joints designated on the Drawings to be "roughened", uniformly roughen the surface of the concrete to a full amplitude (distance between high and low points or side to side) of approximately 1/4 inch to expose a fresh face. Thoroughly clean joint surfaces of loose or weakened materials by water-blasting or sandblasting and prepare for bonding.
6. Keyways shall not be used in construction joints unless specifically shown on the Drawings or approved by the Engineer.

B. Expansion Joints

1. Do not extend through expansion joints, reinforcement, or other embedded metal items that are continuously bonded to concrete on each side of joint.
2. Position premolded joint filler material accurately. Secure the joint filler against displacement during concrete placement and compaction. Place joint filler over the face of the joint, allowing for sealant grooves as detailed on the Drawings. Tape all joint filler splices to prevent intrusion of mortar. Seal expansion joints as shown on the Drawings.
3. Expansion joints shall be 3/4 inch in width unless otherwise noted on the Drawings.

C. Control Joints

1. Provide sealant grooves, sealants, and waterstops at control joints in slabs on grade or walls as detailed. Provide waterstops at all wall and slab control joints in water containment structures and at other locations shown on the Drawings.
2. Control joints may be sawed if specifically approved by the Engineer. If control joint grooves are sawed, properly time the saw cutting with the time of the concrete set. Start cutting as soon as concrete has hardened sufficiently to prevent aggregates from being dislodged by the saw. Complete cutting before shrinkage stresses have developed sufficiently to induce cracking. No reinforcing shall be cut during sawcutting.
3. Extend every other bar of reinforcing steel through control joints or as indicated on the Drawings. Where specifically noted on the Drawings, coat the concrete surface with a bond breaker before placing new concrete against it. Avoid coating reinforcement or waterstops with bond breaker at these locations.

END OF SECTION

SECTION 03300
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor and materials required and install cast-in-place concrete complete as shown on the Drawings and as specified herein.

1.02 RELATED WORK

A. Section 03100, Concrete Formwork.
B. Section 03200, Concrete Reinforcement.
C. Section 03250, Concrete Joints and Joint Accessories.
D. Section 03360, Concrete Finishes.
E. Section 03600, Grout.

1.03 SUBMITTALS

The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance:

A. Submit shop drawings and product data including the following:

1. Sources of cement, pozzolan, and aggregates.

2. Material Safety Data Sheets (MSDS) for all concrete components and admixtures.

3. Air-entraining admixture. Product data including catalogue cut, technical data, storage requirements, product life, recommended dosage, temperature considerations, and conformity to ASTM standards.

4. Water-reducing admixture. Product data including catalogue cut, technical data, storage requirements, product life, recommended dosage, temperature considerations, and conformity to ASTM standards.

5. High-range water-reducing admixture (plasticizer). Product data including catalogue cut, technical data, storage requirements, product life, recommended dosage, temperature considerations, retarding effect, slump range, and conformity to ASTM standards. Identify proposed locations of use.

6. Concrete mix for each formulation of concrete proposed for use including constituent quantities per cubic yard, water-cementitious materials ratio, concrete slump, type, and manufacturer of cement. Provide either a. or b. below for each mix proposed.

   a. Standard deviation data for each proposed concrete mix based on statistical records.
   b. The curve of water-cementitious materials ratio versus concrete cylinder strength for each formulation of concrete proposed based on laboratory tests. The cylinder strength shall be the average of the 28-day cylinder strength test results for each mix. Provide results of 7- and 14-day tests if available.

7. Sheet curing material. Product data including catalogue cut, technical data and, conformity to ASTM standard.

8. Liquid curing compound. Product data including catalogue cut, technical data, storage requirements, product life, application rate, and conformity to ASTM standards. Identify proposed locations of use.

B. Samples

1. Fine and coarse aggregates if requested by the Engineer.

C. Test Reports

1. Fine aggregates: Sieve analysis, physical properties, and deleterious substance.
2. Coarse aggregates: Sieve analysis, physical properties, and deleterious substances.
3. Cements: Chemical analysis and physical properties for each type.
4. Pozzolans: Chemical analysis and physical properties.
5. Proposed concrete mixes: Compressive strength, slump, and air content.

D. Certifications

1. Certify admixtures used in the same concrete mix are compatible with each other and the aggregates.
2. Certify admixtures are suitable for use in contact with potable water after 30 days of concrete curing.
3. Certify curing compound is suitable for use in contact with potable water after 30 days (non-toxic and free of taste or odor).

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to herein shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

A. American Concrete Institute (ACI)

1. ACI 301—Standard Specification for Structural Concrete.
2. ACI 304.1—Guide for the Use of Preplaced Aggregate Concrete for Structural and Mass Concrete Applications.
3. ACI 305.1—Standard Specification for Hot Weather Concreting.
4. ACI 306.1—Standard Specification for Cold Weather Concreting.
5. ACI 318—Building Code Requirements for Structural Concrete and Commentary.

B. American Society for Testing and Materials (ASTM)

1. ASTM C31—Standard Practice for Making and Curing Concrete Test Specimens in the Field.
2. ASTM C33—Standard Specification for Concrete Aggregates.
3. ASTM C39—Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
4. ASTM C42—Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
5. ASTM C94—Standard Specification for Ready-Mixed Concrete.
6. ASTM C143—Standard Test Method for Slump of Hydraulic-Cement Concrete.
7. ASTM C150—Standard Specification for Portland Cement.
8. ASTM C171—Standard Specification for Sheet Materials for Curing Concrete.
9. ASTM C173—Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
10. ASTM C231—Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
11. ASTM C260—Standard Specification for Air-Entraining Admixtures for Concrete.
12. ASTM C309—Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
13. ASTM C494—Standard Specification for Chemical Admixtures for Concrete.
14. ASTM C618—Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

15. ASTM C989—Standard Specification for Slag Cement for Use in Concrete and Mortars.
16. ASTM C1017—Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.

C. National Ready Mixed Concrete Association (NRMCA)

1.06 QUALITY ASSURANCE

A. Reinforced concrete shall comply with specifications and standards noted above. The most stringent requirement of the specifications, standards, and this Section shall apply when conflicts exist.

B. Only one source of cement and aggregates shall be used on any one structure. Concrete shall be uniform in color and appearance.

C. Well in advance of placing concrete, discuss with the Engineer the sources of individual materials and batched concrete proposed for use. Discuss placement methods, waterstops, and curing. Propose methods of hot and cold weather concreting as required. Before the placement of any concrete containing a high-range water-reducing admixture (plasticizer), the Contractor, accompanied by the plasticizer manufacturer, shall discuss the properties and techniques of batching and placing plasticized concrete.

D. If, during the progress of the work, it is impossible to secure concrete of the required workability and strength with the materials being furnished, the Engineer may order such changes in proportions or materials, or both, as may be necessary to secure the desired properties. All changes so ordered shall be made at the Contractor's expense.

E. If, during the progress of the work, the materials from the sources originally accepted change in characteristics, the Contractor shall, at his/her expense, make new acceptance tests of aggregates and establish new design mixes.

F. Testing of the following materials shall be furnished by the Contractor to verify conformity with this Section and the stated ASTM Standards.

1. Fine aggregates for conformity with ASTM C33: Sieve analysis, physical properties, and deleterious substances.
2. Coarse aggregates for conformity with ASTM C33: Sieve analysis, physical properties, and deleterious substances.
3. Cements for conformity with ASTM C150: Chemical analysis and physical properties.
4. Pozzolans for conformity with ASTM C618: Chemical analysis and physical properties.

5. Proposed concrete mix designs: Compressive strength, slump and air content.

G. Field testing and inspection services will be provided by the Contractor. The cost of such work, except as specifically stated otherwise, shall be paid by the Contractor. Testing of the following items shall be by the Contractor to verify conformity with this Section.

1. Concrete placements: Compressive strength (cylinders), compressive strength (cores), slump, and air content.
2. Other materials or products that may come under question.

H. All materials incorporated in the work shall conform to accepted samples.

1.07 WARRANTIES (NOT USED)

1.08 DELIVERY, STORAGE, AND HANDLING

A. Cement: Store in weathertight buildings, bins, or silos to provide protection from dampness and contamination and to minimize warehouse set.

B. Aggregate: Arrange and use stockpiles to avoid excessive segregation or contamination with other materials or with other sizes of like aggregates. Build stockpiles in successive horizontal layers not exceeding 3 feet in thickness. Complete each layer before the next is started. Do not use frozen or partially frozen aggregate.

C. Sand: Arrange and use stockpiles to avoid contamination. Allow sand to drain to uniform moisture content before using. Do not use frozen or partially frozen aggregates.

D. Admixtures: Store in closed containers to avoid contamination, evaporation, or damage. Provide suitable agitating equipment to assure uniform dispersion of ingredients in admixture solutions which tend to separate. Protect liquid admixtures from freezing and other temperature changes which could adversely affect their characteristics.

E. Pozzolan: Store in weathertight buildings, bins, or silos to provide protection from dampness and contamination.

F. Sheet Curing Materials: Store in weathertight buildings or off the ground and under cover.

G. Liquid Curing Compounds: Store in closed containers.

1.09 QUALIFICATIONS (NOT USED)

1.10 TESTING REQUIREMENTS (NOT USED)

1.11 WEATHER CONSTRAINTS (NOT USED)

PART 2 PRODUCTS

2.01 GENERAL

A. The use of manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configuration desired.

B. Cement: U.S. made Portland cement complying with ASTM C150. Air entraining cements shall not be used. Cement brand shall be subject to approval by the Engineer and one brand shall be used throughout the work.

2.02 MATERIALS

A. Materials shall comply with this Section and any applicable State or local requirements.

B. Cement: The following cement type(s) shall be used:

1. All Classes – Type I/II or Type II.

C. Fine Aggregate: Washed inert natural sand conforming to the requirements of ASTM C33.

D. Coarse Aggregate: Well-graded crushed stone or washed gravel conforming to the requirements of ASTM C33. Grading requirements shall be as listed in ASTM C33 Table 2 for the specified coarse aggregate size number. Limits of Deleterious Substances and Physical Property Requirements shall be as listed in ASTM C33 Table 3 for severe weather regions. Size numbers for the concrete mixes shall be as shown in Table 1 herein.

E. Water: Potable water free from injurious amounts of oils, acids, alkalis, salts, organic matter, or other deleterious substances.

F. Admixtures: Admixtures shall be free of chlorides and alkalis (except for those attributable to water). When it is required to use more than one admixture in a concrete mix, the admixtures shall be from the same manufacturer. Admixtures

shall be compatible with the concrete mix including other admixtures and shall be suitable for use in contact with potable water after 30 days of concrete curing.

1. Air-Entraining Admixture: The admixture shall comply with ASTM C260. Proportioning and mixing shall be in accordance with manufacturer’s recommendations.
2. Water-Reducing Agent: The admixture shall comply with ASTM C494, Type A. Proportioning and mixing shall be in accordance with manufacturer's recommendations.
3. High-Range Water-Reducer (Plasticizer): The admixture shall comply with ASTM C494, Type F and shall result in non-segregating plasticized concrete with little bleeding and with the physical properties of low water/cement ratio concrete. The treated concrete shall be capable of maintaining its plastic state in excess of 2 hours. Proportioning and mixing shall be in accordance with manufacturer's recommendations.
4. Admixtures causing retarded or accelerated setting of concrete shall not be used without written approval from the Engineer. When allowed, the admixtures shall be retarding or accelerating water reducing or high range water reducing admixtures.

G. Pozzolan (Fly Ash): Pozzolan shall be Class C or Class F fly ash complying with ASTM C618 except the Loss on Ignition (LOI) shall be limited to 3% maximum.

H. Ground-Granulated Blast Furnace Slag: Ground-granulated blast furnace slag shall conform to the following:

1. ASTM C989.
2. Slag activity classification: Grade 100 or 120.

I. Sheet Curing Materials. Waterproof paper, polyethylene film, or white burlap-polyethylene sheeting all complying with ASTM C171.

J. Liquid Curing Compound. Liquid membrane-forming curing compound shall comply with the requirements of ASTM C309, Type 1-D (clear or translucent with fugitive dye) and shall contain no wax, paraffin, or oil. Curing compound shall be approved for use in contact with potable water after 30 days (non-toxic and free of taste or odor). Curing compound shall comply with Federal, State, and local VOC limits.

2.03 MIXES

A. Development of mix designs and testing shall be by an independent testing laboratory acceptable to the Engineer engaged by and at the expense of the Contractor.

B. Select proportions of ingredients to meet the design strength and materials limits specified in Table 1 and to produce concrete having proper placability, durability, strength, appearance, and other required properties. Proportion ingredients to produce a homogenous mixture which will readily work into corners and angles of forms and around reinforcement without permitting materials to segregate or allowing excessive free water to collect on the surface.

C. The design mix shall be based on standard deviation data of prior mixes with essentially the same proportions of the same constituents or, if such data is not available, be developed by a testing laboratory, acceptable to the Engineer, engaged by and at the expense of the Contractor. Acceptance of mixes based on standard deviation shall be based on the modification factors for standard deviation tests contained in ACI 318. The water content of the concrete mix, determined by laboratory testing, shall be based on a curve showing the relation between water cementitious ratio and 7- and 28-day compressive strengths of concrete made using the proposed materials. The curves shall be determined by four or more points, each representing an average value of at least three test specimens at each age. The curves shall have a range of values sufficient to yield the desired data, including the specified design strengths as modified below, without extrapolation. The water content of the concrete mixes to be used, as determined from the curve, shall correspond to strengths 16% greater than the specified design strengths. The resulting mix shall not conflict with the limiting values for maximum water cementitious ratio and net minimum cementitious content as specified in Table 1.

D. Compression Tests: Provide testing of the proposed concrete mix or mixes to demonstrate compliance with the specified design strength requirements in conformity with the above paragraph.

E. Entrained air, as measured by ASTM C231, shall be as shown in Table 1.

1. If the air-entraining agent proposed for use in the mix requires testing methods other than ASTM C231 to accurately determine air content, make special note of this requirement in the admixture submittal.

F. Slump of the concrete as measured by ASTM C143, shall be as shown in Table 1. If a high-range water-reducer (plasticizer) is used, the slump indicated shall be that measured before plasticizer is added. Plasticized concrete shall have a slump ranging from 5 to 8 inches.

G. Proportion admixtures according to the manufacturer's recommendations. Two or more admixtures specified may be used in the same mix provided that the admixtures in combination retain full efficiency and have no deleterious effect on the concrete or on the properties of each other.

TABLE 1 CONCRETE MIX REQUIREMENTS						
Class	Design Strength (1)	Cement (2)	Fine Aggregate (2)	Coarse Aggregate (3)		Cementitious Content (4)
A	2,500	C150 Type II	C33	57		440 minimum
B	3,000	C150 Type II	C33	57		480 minimum
C	4,000	C150 Type II	C33	57		560 minimum
Class	W/cm Ratio (5)	Fly Ash	AE Range (6)	WR (7)	HRWR (8)	Slump Range Inches
A	0.63 maximum	--	3.5 to 5	Yes	*	1 to 4
B	0.54 maximum	--	3.5 to 5	Yes	*	1 to 3
C	0.44 maximum	25% maximum	3.5 to 5	Yes	*	3 to 5

NOTES:
(1) Minimum compressive strength in psi at 28 days.
(2) ASTM designation.
(3) Size number in ASTM C33.
(4) Cementitious content in pounds/cubic yard.
(5) W/Cm is water-cementitious ratio by weight.
(6) AE is percent air-entrainment.
(7) WR is water-reducer admixture.
(8) HRWR is high-range water-reducer admixture.
* HRWR used at the Contractor's option, except where walls are 14 inches thick or less and the wall height exceeds 12 feet, a mix including a plasticizer must be used.

PART 3 EXECUTION

3.01 MEASURING MATERIALS

A. Concrete shall be composed of Portland cement, fine aggregate, coarse aggregate, water and admixtures as specified and shall be produced by a plant acceptable to the Engineer. All constituents, including admixtures, shall be batched at the plant except a high-range water-reducer may also be added in the field.

B. Measure materials for batching concrete by weighing in conformity with and within the tolerances given in ASTM C94 except as otherwise specified. Scales shall have been certified by the local Sealer of Weights and Measures within 1 year of use.

C. Measure the amount of free water in fine aggregates within 0.3% with a moisture meter. Compensate for varying moisture contents of fine aggregates. Record the number of gallons of water as-batched on printed batching tickets.

D. Admixtures shall be dispensed either manually using calibrated containers or measuring tanks, or by means of an automatic dispenser approved by the manufacturer of the specific admixture.

1. Charge air-entraining and chemical admixtures into the mixer as a solution using an automatic dispenser or similar metering device.
2. Inject multiple admixtures separately during the batching sequence.

3.02 MIXING AND TRANSPORTING

A. Batch plants shall have a current NRMCA Certification or equal.

B. Concrete shall be ready-mixed concrete produced by equipment acceptable to the Engineer. No hand-mixing will be permitted. Clean each transit mix truck drum and reverse drum rotation before the truck proceeds under the batching plant. Equip each transit-mix truck with a continuous, nonreversible, revolution counter showing the number of revolutions at mixing speeds.

C. Ready-mix concrete shall be transported to the site in watertight agitator or mixer trucks loaded not in excess of their rated capacities as stated on the name plate.

D. Keep the water tank valve on each transit truck locked at all times. Any addition of water above the appropriate W/Cm ratio must be directed by the Engineer. Added water shall be incorporated by additional mixing of at least 35 revolutions. All added water shall be metered and the amount of water added shall be shown on each delivery ticket.

E. All central plant and rolling stock equipment and methods shall comply with ACI 318 and ASTM C94.

F. Select equipment of size and design to ensure continuous flow of concrete at the delivery end. Metal or metal-lined non-aluminum discharge chutes shall be used and shall have slopes not exceeding 1 vertical to 2 horizontal and not less than 1 vertical to 3 horizontal. Chutes more than 20 feet long and chutes not meeting slope requirements may be used if concrete is discharged into a hopper before distribution.

G. Retempering (mixing with or without additional cement, aggregate, or water) of concrete or mortar which has reached initial set will not be permitted.

H. Handle concrete from mixer to placement as quickly as practicable while providing concrete of required quality in the placement area. Dispatch trucks from the batching plant so they arrive at the work site just before the concrete is required, thus avoiding excessive mixing of concrete while waiting or delays in placing successive layers of concrete in the forms.

I. Furnish a delivery ticket for ready mixed concrete to the Engineer as each truck arrives. Each ticket shall provide a printed record of the weight of cement and each aggregate as batched individually. Use the type of indicator that returns for zero punch or returns to zero after a batch is discharged. Clearly indicate the weight of fine and coarse aggregate, cement, and water in each batch, the quantity delivered, the time any water is added, and the numerical sequence of the delivery. Show the time of day batched and time of discharge from the truck. Indicate the number of revolutions of the truck mixer.

J. Temperature and Mixing Time Control

1. In cold weather, do not allow the as-mixed temperature of the concrete and concrete temperatures at the time of placement in the forms to drop below 40 degrees F.

2. If water or aggregate has been heated, combine water with aggregate in the mixer before cement is added. Do not add cement to mixtures of water and aggregate when the temperature of the mixture is greater than 90 degrees F.

3. In hot weather, cool ingredients before mixing to maintain temperature of the concrete below the maximum placing temperature of 90 degrees F. If necessary, substitute well-crushed ice for all or part of the mixing water.

4. The maximum time interval between the addition of mixing water and/or cement to the batch and the placing of concrete in the forms shall not exceed the values shown in Table 2.

TABLE 2 MAXIMUM TIME TO DISCHARGE OF CONCRETE

Air or Concrete Temperature (whichever is higher)	Maximum Time
80 to 90 Degree F (27 to 32 Degree C)	45 minutes
70 to 79 Degree F (21 to 26 Degree C)	60 minutes
40 to 69 Degree F (5 to 20 Degree C)	90 minutes

5. If an approved high-range water-reducer (plasticizer) is used to produce plasticized concrete, the maximum time interval shall not exceed 90 minutes.

3.03 CONCRETE APPEARANCE

A. Concrete mix showing either poor cohesion or poor coating of the coarse aggregate with paste shall be remixed. If this does not correct the condition, the concrete shall be rejected. If the slump is within the allowable limit, but excessive bleeding, poor workability, or poor finishability are observed, changes in the concrete mix shall be obtained only by adjusting one or more of the following:

1. The gradation of aggregate.
2. The proportion of fine and coarse aggregate.
3. The percentage of entrained air, within the allowable limits.

B. Concrete for the work shall provide a homogenous structure which, when hardened, will have the required strength, durability, and appearance. Mixtures and workmanship shall be such that concrete surfaces, when exposed, will require no finishing. When concrete surfaces are stripped, the concrete, when viewed in good lighting from 10 feet away, shall be pleasing in appearance, and at 20 feet shall show no visible defects.

3.04 PLACING AND COMPACTING

A. Placing

1. Verify that all formwork completely encloses concrete to be placed and is securely braced before concrete placement. Remove ice, excess water, dirt, and other foreign materials from forms. Confirm that reinforcement and other embedded items are securely in place. Have a competent workman at the location of the placement who can assure that reinforcing steel and embedded items remain in designated locations while concrete is being placed. Sprinkle semi-porous subgrades or forms to eliminate suction of water from the mix. Seal extremely porous subgrades in an approved manner.

2. Deposit concrete as near its final position as possible to avoid segregation due to rehandling or flowing. Place concrete continuously at a rate which ensures the concrete is being integrated with fresh plastic concrete. Do not deposit concrete which has partially hardened or has been contaminated by foreign materials or on concrete which has hardened sufficiently to cause formation of seams or planes of weakness within the section. If the section

cannot be placed continuously, place construction joints as specified or as approved.

3. Pumping of concrete will be permitted. Use a mix design and aggregate sizes suitable for pumping and submit for approval.

4. Remove temporary spreaders from forms when the spreader is no longer useful. Temporary spreaders may remain embedded in concrete only when made of galvanized metal or concrete and if prior approval has been obtained.

5. Where surface mortar is to form the base of a finish, especially surfaces designated to be painted, work coarse aggregate back from forms with a suitable tool to bring the full surface of the mortar against the form. Prevent the formation of excessive surface voids.

6. Slabs

   a. After suitable bulkheads, screeds, and jointing materials have been positioned, the concrete shall be placed continuously between construction joints beginning at a bulkhead, edge form, or corner. Each batch shall be placed into the edge of the previously placed concrete to avoid stone pockets and segregation.
   b. Avoid delays in casting. If there is a delay in casting, the concrete placed after the delay shall be thoroughly spaded and consolidated at the edge of that previously placed to avoid cold joints. Concrete shall then be brought to correct level and struck off with a straightedge. Bullfloats or darbies shall be used to smooth the surface, leaving it free of humps or hollows.

B. Compacting

1. Consolidate concrete by vibration, puddling, spading, rodding, or forking so that concrete is thoroughly worked around reinforcement, embedded items and openings, and into corners of forms. Puddling, spading, etc, shall be continuously performed along with vibration of the placement to eliminate air or stone pockets which may cause honeycombing, pitting, or planes of weakness.

2. All concrete shall be placed and compacted with mechanical vibrators. The number, type, and size of the units shall be approved by the Engineer in advance of placing operations. No concrete shall be ordered until sufficient approved vibrators (including standby units in working order) are on the job.

3. A minimum frequency of 7,000 rpm is required for mechanical vibrators. Insert vibrators and withdraw at points from 18 to 30 inches apart. At each insertion, vibrate sufficiently to consolidate concrete, generally from 5 to 15 seconds. Do not over-vibrate so as to segregate. Keep a spare vibrator on the site during concrete placing operations.

4. Concrete Slabs: Concrete for slabs less than 8 inches thick shall be consolidated with vibrating screeds; slabs 8 to 12 inches thick shall be compacted with internal vibrators and (optionally) with vibrating screeds. Vibrators shall always be placed into concrete vertically and shall not be laid horizontally or laid over.

5. Amount of Vibration: Vibrators are to be used to consolidate properly placed concrete but shall not be used to move or transport concrete in the forms. Vibration shall continue until:

   a. Frequency returns to normal.
   b. Surface appears liquefied, flattened, and glistening.
   c. Trapped air ceases to rise.
   d. Coarse aggregate has blended into surface, but has not disappeared.

3.05 CURING AND PROTECTION

A. Protect all concrete work against injury from the elements and defacements of any nature during construction operations.

B. Curing Methods

1. Curing Methods for Concrete Surfaces: Cure concrete to retain moisture and maintain specified temperature at the surface for a minimum of 7 days after placement. Curing methods to be used are as follows:

   a. Water Curing: Keep entire concrete surface wet by ponding, continuous sprinkling, or covered with saturated burlap. Begin wet cure as soon as concrete attains an initial set and maintain wet cure 24 hours a day.
   b. Sheet Material Curing: Cover entire surface with sheet material. Securely anchor sheeting to prevent wind and air from lifting the sheeting or entrapping air under the sheet. Place and secure sheet as soon as initial concrete set occurs.
   c. Liquid Membrane Curing: Apply over the entire concrete surface except for surfaces to receive additional concrete. Curing compound shall NOT be placed on any concrete surface where

additional concrete is to be placed, where concrete sealers or surface coatings are to be used, or where the concrete finish requires an integral floor product. Curing compound shall be applied as soon as the free water on the surface has disappeared and no water sheen is visible, but not after the concrete is dry or when the curing compound can be absorbed into the concrete. Application shall be in compliance with the manufacturer's recommendations.

2. Specified applications of curing methods:

   a. Slabs on Grade and Footings (not used to contain water): Water curing, sheet material curing, or liquid membrane curing.
   b. Formed Surfaces: None if nonabsorbent forms are left in place for 7 days. Water cure if absorbent forms are used. Water cure if forms are removed before 7 days. Exposed horizontal surfaces of formed walls or columns shall be water cured for 7 days or until next placement of concrete is made.
   c. Surfaces of Concrete Joints: Water cured or sheet material cured.
   d. Finished surfaces and slabs shall be protected from the direct rays of the sun to prevent checking and crazing.

C. Cold Weather Concreting

1. *Cold weather* is defined as a period when for more than 3 successive days, the average daily outdoor temperature drops below 40 degrees F. The average daily temperature shall be calculated as the average of the highest and the lowest temperature during the period from midnight to midnight.

2. Cold weather concreting shall conform to ACI 306.1 and the additional requirements specified herein. Temperatures at the concrete placement shall be recorded at 12-hour intervals (minimum).

3. Discuss a cold weather work plan with the Engineer. The discussion shall encompass the methods and procedures proposed for use during cold weather including the production, transportation, placement, protection, curing, and temperature monitoring of the concrete. The procedures to be implemented upon abrupt changes in weather conditions or equipment failures shall also be discussed. Cold weather concreting shall not begin until the work plan is acceptable to the Engineer.

4. During periods of cold weather, concrete shall be protected to provide continuous warm, moist curing (with supplementary heat when required) for a total of at least 350 degree-days of curing.

   a. Degree-days are defined as the total number of 24-hour periods multiplied by the weighted average daily air temperature at the surface of the concrete (e.g.: 5 days at an average 70 degrees F = 350 degree-days).
   b. To calculate the weighted average daily air temperature, sum hourly measurements of the air temperature in the shade at the surface of the concrete taking any measurement less than 50 degrees F as 0 degrees F. Divide the sum thus calculated by 24 to obtain the weighted average temperature for that day.

5. Salt, manure, or other chemicals shall not be used for protection.

6. The protection period for concrete being water cured shall not be terminated during cold weather until at least 24 hours after water curing has been terminated.

D. Hot Weather Concreting

1. *Hot weather* is defined as any combination of high air temperatures, low relative humidity and wind velocity which produces a rate of evaporation estimated in accordance with ACI 305.1, approaching or exceeding 0.2 lbs/sq ft/hr).

2. Concrete placed during hot weather shall be batched, delivered, placed, cured, and protected in compliance with the recommendations of ACI 305.1 and the additional requirements specified herein.

   a. Temperature of concrete being placed shall not exceed 90 degrees F and every effort shall be made to maintain a uniform concrete mix temperature below this level. The temperature of the concrete shall be such that it will cause no difficulties from loss of slump, flash set, or cold joints.
   b. All necessary precautions shall be taken to promptly deliver, to promptly place the concrete upon its arrival at the job, and to provide vibration immediately after placement.
   c. The Engineer may direct the Contractor to immediately cover plastic concrete with sheet material.

3. Discuss with the Engineer a work plan describing the methods and procedures proposed to use for concrete placement and curing during hot

weather periods. Hot weather concreting shall not begin until the work plan is acceptable to the Engineer.

3.06 REMOVAL OF FORMS

A. Except as otherwise specifically authorized by the Engineer, forms shall not be removed before the concrete has attained a strength of at least 70% of its specified design strength for beams and slabs, nor before reaching the following number of day-degrees of curing (whichever is the longer):

TABLE 3 MINIMUM TIME TO FORM REMOVAL	
Forms for	Degree Days
Beams and Slabs	500

NOTE: See definition of degree-days in Paragraph 3.05D above.

B. Shores shall not be removed until the concrete has attained at least 70% of its specified design strength and also sufficient strength to support safely its own weight and construction live loads.

3.07 INSPECTION AND FIELD TESTING

A. The batching, mixing, transporting, placing, and curing of concrete shall be subject to the inspection of the Engineer at all times. The Contractor shall advise the Engineer of his/her readiness to proceed at least 24 hours before each concrete placement. The Engineer will inspect the preparations for concreting including the preparation of previously placed concrete; the reinforcing steel; and the alignment, cleanliness, and tightness of formwork. No placement shall be made without the inspection and acceptance of the Engineer.

B. Sets of field control cylinder specimens will be taken by the Engineer (or inspector) during the progress of the work, in compliance with ASTM C31. The number of sets of concrete test cylinders taken of each class of concrete placed each day shall not be less than one set per day, nor less than one set for each 150 cubic yards of concrete nor less than one set for each 5,000 square feet of surface area for slabs or walls.

1. A "set" of test cylinders consists of five cylinders: one to be tested at 7 days and two to be tested and their strengths averaged at 28 days. The fourth may be used for a special test at 3 days or to verify strength after 28 days if the 28-day test results are low. The fifth is to be used at 28 days or 56 days where test results are low.
2. When the average 28-day compressive strength of the cylinders in any set falls below the specified design strength or below proportional minimum 7-day strengths (where proper relation between 7- and 28-day strengths

have been established by tests), proportions, water content, or temperature conditions shall be changed to achieve the required strengths.

C. Cooperate in the making of tests by allowing free access to the work for the selection of samples, providing an insulated closed curing box for specimens, affording protection to the specimens against injury or loss through the operations, and furnish material and labor required for the purpose of taking concrete cylinder samples. All shipping of specimens will be paid for by the Contractor. Curing boxes shall be acceptable to the Engineer.

D. Slump tests will be made in the field immediately before placing the concrete. Such tests shall be made in accordance with ASTM C143. If the slump is greater the specified range, the concrete shall be rejected.

E. Air Content: Test for air content shall be made on fresh concrete samples. Air content for concrete made of ordinary aggregates having low absorption shall be made in compliance with either the pressure method complying with ASTM C231 or by the volumetric method complying with ASTM C173.

F. The Engineer may have cores taken from any questionable area in the concrete work such as construction joints and other locations as required for determination of concrete quality. The results of tests on such cores shall be the basis for acceptance, rejection, or determining the continuation of concrete work.

G. Cooperate in obtaining cores by allowing free access to the work and permitting the use of ladders, scaffolding, and such incidental equipment as may be required. Repair all core holes. The work of cutting and testing the cores will be at the expense of the Owner.

3.08 FAILURE TO MEET REQUIREMENTS

A. Should the strengths shown by the test specimens made and tested in compliance with the previous provisions fall below the values given in Table 1, the Engineer shall have the right to require changes in proportions outlined to apply to the remainder of the work. Furthermore, the Engineer shall have the right to require additional curing on those portions of the structure represented by the test specimens which failed. The cost of such additional curing shall be at the Contractor's expense. In the event that such additional curing does not give the strength required, as evidenced by core and/or load tests, the Engineer shall have the right to require strengthening or replacement of those portions of the structure which fail to develop the required strength. The cost of all such core borings and/or load tests and any strengthening or concrete replacement required because strengths of test specimens are below that specified, shall be entirely at the expense of the Contractor. In such cases of failure to meet strength requirements,

the Contractor and Engineer shall confer to determine what adjustment, if any, can be made in compliance with sections titled "Strength" and "Failure to Meet Strength Requirements" of ASTM C94. The "purchaser" referred to in ASTM C94 is the Contractor in this Section.

B. When the tests on control specimens of concrete fall below the specified strength, the Engineer will permit check tests for strengths to be made by means of typical cores drilled from the structure in compliance with ASTM C42 and C39. In the case of cores not indicating adequate strength, the Engineer, in addition to other recourses, may require, at the Contractor's expense, load tests on any one of the slabs, beams, piles, caps, and columns in which such concrete was used. Tests need not be made until concrete has aged 60 days.

C. Should the strength of test cylinders fall below 60% of the required minimum 28-day strength, the concrete shall be rejected and shall be removed and replaced.

3.09 PATCHING AND REPAIRS

A. It is the intent of this Section to require quality work including adequate forming, proper mixture and placement of concrete, and curing so completed concrete surfaces will require no patching.

B. Defective concrete and honeycombed areas as determined by the Engineer shall be repaired as specified by the Engineer.

C. As soon as the forms have been stripped and the concrete surfaces exposed, fins and other projections shall be removed; recesses left by the removal of form ties shall be filled; and surface defects which do not impair structural strength shall be repaired. Clean all exposed concrete surfaces and adjoining work stained by leakage of concrete, to approval of the Engineer.

D. Immediately after removal of forms remove plugs and break off metal ties as required by Section 03100, Concrete Formwork. Promptly fill holes upon stripping as follows: Moisten the hole with water, followed by a 1/16 inch brush coat of neat cement slurry mixed to the consistency of a heavy paste. Immediately plug the hole with a 1 to 1.5 mixture of cement and concrete sand mixed slightly damp to the touch (just short of "balling"). Hammer the grout into the hole until dense, and an excess of paste appears on the surface in the form of a spiderweb. Trowel smooth with heavy pressure. Avoid burnishing.

E. When patching exposed surfaces the same source of cement and sand as used in the parent concrete shall be employed. Adjust color if necessary by addition of proper amounts of white cement. Rub lightly with a fine Carborundum stone at an age of 1 to 5 days if necessary to bring the surface down with the parent concrete.

Exercise care to avoid damaging or staining the virgin skin of the surrounding parent concrete. Wash thoroughly to remove all rubbed matter.

3.10 SCHEDULE

A. Table 4 presents the general applications for the various concrete classes and design strengths:

TABLE 4 CONCRETE SCHEDULE

Class	Design Strength (psi)	Description
A	2,500	Concrete fill and duct encasement
B	3,000	Concrete overlay slabs and pavements
C	4,000	Slabs on grade and all other structural concrete

END OF SECTION

SECTION 03360
CONCRETE FINISHES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment, and incidentals required and finish cast-in-place concrete surfaces as shown on the Drawings and as specified herein.

1.02 RELATED WORK

A. Section 03100, Concrete Formwork.
B. Section 03300, Cast-In-Place Concrete.
C. Section 03600, Grout.

1.03 SUBMITTALS

The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance:

A. Submit to the Engineer shop drawings and product data showing materials of construction and details of installation for:

1. Concrete sealer. Confirmation that the sealer is compatible with additionally applied coatings shall also be submitted.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to herein shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

A. American Society for Testing and Materials (ASTM)

1. ASTM C33—Standard Specification for Concrete Aggregates.

1.06 QUALITY ASSURANCE

A. Finishes

1. For concrete which will receive additional applied finishes or materials, the surface finish specified is required for the proper application of the specified manufacturer's products. Where alternate products are approved for use, determine if changes in finishes are required and provide the proper finishes to receive these products.

2. Changes in finishes made to accommodate products different from those specified shall be performed at no additional cost to the Owner. Submit the proposed new finishes and their construction methods to the Engineer for approval.

3. Services of Manufacturer’s Representative:

a. Make available at no extra cost to the Owner, upon 72 hours notification, the services of a qualified field representative of the manufacturer of curing compound, sealer, or hardener to instruct the user on the proper application of the product under prevailing job conditions.

1.07 WARRANTIES (NOT USED)

1.08 DELIVERY, STORAGE, AND HANDLING (NOT USED)

1.09 QUALIFICATIONS (NOT USED)

1.10 TESTING REQUIREMENTS (NOT USED)

1.11 WEATHER CONSTRAINTS (NOT USED)

PART 2 PRODUCTS

2.01 MATERIALS

A. Concrete sealer shall be "MasterKure CC 180 WB", by Master Builders Solutions, Shakopee, MN, or equal.

PART 3 EXECUTION

3.01 FORMED SURFACES

A. Forms shall not be removed before the requirements of Section 03300, Cast-In-Place Concrete, have been satisfied.

B. Exercise care to prevent damaging edges or obliterating the lines of chamfers, rustications, or corners when removing the forms or performing any other work adjacent thereto.

C. Clean all exposed concrete surfaces and adjoining work stained by leakage of concrete.

D. Rough-Form Finish

1. Immediately after stripping forms and before concrete has changed color, carefully remove all fins and projections.
2. Promptly fill holes left by tie cones and defects as specified in Section 03300, Cast-In-Place Concrete.

3.02 FLOORS AND SLABS

A. Floated Finish

1. Hand Floating

a. In lieu of power floating, small areas may be compacted by hand floating. The dry cement/sand shake previously specified shall be used unless specifically eliminated by the Engineer. Screed the floors and slabs with straightedges to the established grades shown on the Drawings. While the concrete is still green, but sufficiently hardened to support a finisher and kneeboards with no more than 1/4 inch indentation, wood float to a true, even plane with no coarse aggregate visible. Use sufficient pressure on the wood floats to bring moisture to the surface.

2. Finishing Tolerances

a. Level floors and slabs to a tolerance of plus or minus 1/8 inch when checked with a 10-foot straightedge placed anywhere on the slab in any direction. Where drains occur, pitch floors to drains such that there are no low spots left undrained. Failure to meet

either of the above requirements shall be cause for removal, grinding, or other correction as directed by the Engineer.

B. Broom Finish

1. Screed slabs with straightedges to the established grades indicated on the Drawings. When the concrete has stiffened sufficiently to maintain small surface indentations, draw a stiff bristle broom lightly across the surface in the direction of drainage.

C. Steel Trowel Finish

1. Finish concrete as specified in Paragraphs 3.04 and 3.05. Then hand steel trowel to a perfectly smooth hard even finish free from high or low spots or other defects.

D. Concrete Sealer

1. Prepare and seal surfaces indicated on the room finish schedule to receive a sealer as follows:

   a. Finish concrete as specified in the preceding paragraphs and in accordance with the Schedule in Paragraph 3.05 below.
   b. Newly Placed Concrete: Surface must be sound and properly finished. Surface is application-ready when it is damp but not wet and can no longer be marred by walking workmen.
   c. Newly-Cured Bare Concrete: Level any spots gouged out by trades. Remove all dirt, dust, droppage, oil, grease, asphalt, and foreign matter. Cleanse with caustics and detergents as required. Rinse thoroughly and allow to dry so that surface is no more than damp, and not wet.
   d. Aged Concrete: Restore surface soundness by patching, grouting, filling cracks and holes, etc. Surface must also be free of any dust, dirt, and other foreign matter. Use power tools and/or strippers to remove any incompatible sealers or coatings. Cleanse as required, following the procedure indicated under cured concrete.
   e. Methods: Apply sealer so as to form a continuous, uniform film by spray, soft-bristle pushbroom, long-nap roller, or lambswool applicator. Ordinary garden-type sprayers, using neoprene hose, are recommended for best results.
   f. Applications: For curing only, apply first coat evenly and uniformly as soon as possible after final finishing at the rate of 200 to 400 square feet per gallon. Apply second coat when all

trades are completed and structure is ready for occupancy at the rate of 400 to 600 square feet per gallon.

g. To meet guarantee and to seal and dustproof, two coats are required. For sealing new concrete, both coats shall be applied full-strength. On aged concrete, when renovating, dustproofing, and sealing, the first coat should be thinned 10 to 15% with reducer in accordance with the manufacturer's directions.

3.03 APPROVAL OF FINISHES

A. All concrete surfaces, when finished, will be inspected by the Engineer.

B. Surfaces which, in the opinion of the Engineer, are unsatisfactory shall be refinished or reworked.

C. After finishing horizontal surfaces, regardless of the finishing procedure specified, the concrete shall be cured in compliance with Section 03300, Cast-In-Place Concrete, unless otherwise directed by the Engineer.

3.04 SCHEDULE OF FINISHES

A. Concrete shall be finished as specified either to remain as natural concrete to receive an additional applied finish or material under another section.

B. Concrete for the following conditions shall be finished as noted on the Drawings and as further specified herein:

1. Concrete for Exterior Walks, Interior and Exterior Stairs: Broomed finish perpendicular to direction of traffic. See Paragraph 3.02B above.

END OF SECTION

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SECTION 03600
GROUT

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment, and incidentals required and install grout complete as shown on the Drawings and as specified herein.

1.02 RELATED WORK

A. Section 03100, Concrete Formwork.
B. Section 03200, Concrete Reinforcement.
C. Section 03250, Concrete Joints and Joint Accessories.
D. Section 03300, Cast-In-Place Concrete.

1.03 SUBMITTALS

The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance:

A. Submit to the Engineer shop drawings and product data showing materials of construction and details of installation for:

1. Commercially manufactured nonshrink cementitious grout. The submittal shall include catalog cuts, technical data, storage requirements, product life, working time after mixing, temperature consideration, conformity to required ASTM standards, and Material Safety Data Sheet.
2. Commercially manufactured nonshrink epoxy grout. The submittal shall include catalog cuts, technical data, storage requirements, product life, working time after mixing, temperature considerations, conformity to required ASTM standards, and Material Safety Data Sheet.

B. Laboratory Test Reports

1. Submit laboratory test data is required under Section 03300, Cast-In-Place Concrete, for concrete to be used as concrete grout.

C. Qualifications

1. Grout manufacturers shall submit documentation that they have at least 10 years of experience in the production and use of the proposed grouts which they will supply.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to herein shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

A. American Society for Testing and Materials (ASTM)

1. ASTM C33—Standard Specification for Concrete Aggregates.
2. ASTM C150—Standard Specification for Portland Cement.
3. ASTM C531—Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.
4. ASTM C579—Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.
5. ASTM C827—Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures.
6. ASTM C1107—Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
7. ASTM D695—Standard Test Method for Compressive Properties of Rigid Plastics.

B. U.S. Army Corps of Engineers Standard (CRD)

1. CRD C-621—Corps of Engineers Specification for Nonshrink Grout.

1.06 QUALITY ASSURANCE

A. Qualifications

1. Grout manufacturer shall have a minimum of 10 years of experience in the production and use of the type of grout proposed for the work.

B. Field Testing

1. All field testing and inspection services required shall be provided by the Contractor. The Contractor shall cooperate with the laboratory and assist in the sampling of materials and shall provide any ladders, platforms, etc., for access to the work. The methods of testing shall comply in detail with the applicable ASTM Standards.
2. The field testing of concrete grout shall be as specified for concrete in Section 03300, Cast-In-Place Concrete.

1.07 WARRANTIES (NOT USED)

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the jobsite in original, unopened packages, clearly labeled with the manufacturer's name, product identification, batch numbers, and printed instructions.

B. Store materials in full compliance with the manufacturer's recommendations. Total storage time from date of manufacture to date of installation shall be limited to 6 months or the manufacturer's recommended storage time, whichever is less.

C. Material which becomes damp or otherwise unacceptable shall be immediately removed from the site and replaced with acceptable material at no additional expense to the Owner.

D. Nonshrink cement-based grouts shall be delivered as preblended, prepackaged mixes requiring only the addition of water.

E. Nonshrink epoxy grouts shall be delivered as premeasured, prepackaged, three-component systems requiring only blending as directed by the manufacturer.

1.09 QUALIFICATIONS (NOT USED)

1.10 TESTING REQUIREMENTS (NOT USED)

1.11 WEATHER CONSTRAINTS (NOT USED)

1.12 DEFINITIONS

A. Nonshrink Grout: A commercially manufactured product that does not shrink in either the plastic or hardened state, is dimensionally stable in the hardened state, and bonds to a clean base plate.

PART 2 PRODUCTS

2.01 GENERAL

A. The use of a manufacturer's name and product or catalog number is for the purpose of establishing the standard of quality desired.

B. Like materials shall be the products of one manufacturer or supplier in order to provide standardization of appearance.

2.02 MATERIALS

A. Nonshrink Cementitious Grout

1. Nonshrink cementitious grouts shall meet or exceed the requirements of ASTM C1107, Grades B or C and CRD C-621. Grouts shall be Portland cement based, contain a pre-proportioned blend of selected aggregates and shrinkage compensating agents and shall require only the addition of water. Nonshrink cementitious grouts shall not contain expansive cement or metallic particles. The grouts shall exhibit no shrinkage when tested in conformity with ASTM C827.

   a. General purpose nonshrink cementitious grout shall conform to the standards stated above and shall be SikaGrout 212 by Sika Corp.; Set Grout by Master Builders, Inc.; Gilco Construction Grout by Gifford Hill & Co.; Euco NS by the Euclid Chemical Co.; NBEC Grout by U.S. Grout Corp.; or equal.
   b. Flowable (Precision) nonshrink cementitious grout shall conform to the standards stated above and shall be Masterflow 928 by Master Builders, Inc.; Hi-Flow Grout by the Euclid Chemical Co.; SikaGrout 212 by Sika Corp.; Supreme Grout by Gifford Hill & Co.; Five Star Grout by U.S. Grout Corp.; or equal.

B. Nonshrink Epoxy Grout

1. Nonshrink epoxy-based grout shall be a pre-proportioned, three-component, 100% solids system consisting of epoxy resin, hardener, and blended aggregate. It shall have a compressive strength of 14,000 psi in 7 days when tested in conformity with ASTM D695 and have a maximum thermal expansion of 30 x 10-6 when tested in conformity with ASTM C531. The grout shall be MasterFlow 648 by Master Builders Inc.; Five Star Epoxy Grout by U.S. Grout Corp.; Sikadur 42 Grout-Pak by Sika Corp.; High Strength Epoxy Grout by the Euclid Chemical Co.; or equal.

PART 3 EXECUTION

3.01 PREPARATION

A. Grout shall be placed over cured concrete which has attained its full design strength unless otherwise approved by the Engineer.

B. Concrete surfaces to receive grout shall be clean and sound; free of ice, frost, dirt, grease, oil, curing compounds, laitance, and paints, and free of all loose material or foreign matter which may effect the bond or performance of the grout.

C. Roughen concrete surfaces by chipping, sandblasting, or other mechanical means to a minimum of 1/4 inch amplitude or provide a raked finish in order to ensure bond of the grout to the concrete. Remove loose or broken concrete. Irregular voids or projecting coarse aggregate need not be removed if they are sound, free of laitance, and firmly embedded into the parent concrete.

1. Air compressors used to clean surfaces in contact with grout shall be the oilless type or equipped with an oil trap in the air line to prevent oil from being blown onto the surface.

D. Remove all loose rust, oil, or other deleterious substances from metal embedments or bottom of baseplates before the installation of the grout.

E. Concrete surfaces shall be washed clean and then kept moist for at least 24 hours before the placement of cementitious or cement grout. Saturation may be achieved by covering the concrete with saturated burlap bags, use of a soaker hose, flooding the surface, or other method acceptable to the Engineer. Upon completion of the 24-hour period, visible water shall be removed from the surface before grouting. The use of an adhesive bonding agent in lieu of surface saturation shall only be used when approved by the Engineer for each specific location of grout installation.

F. Epoxy-based grouts do not require the saturation of the concrete substrate. Surfaces in contact with epoxy grout shall be completely dry before grouting.

G. Construct grout forms or other leakproof containment as required. Forms shall be lined or coated with release agents recommended by the grout manufacturer. Forms shall be of adequate strength, securely anchored in place, and shored to resist the forces imposed by the grout and its placement.

H. Forms for epoxy grout shall be designed to allow the formation of a hydraulic head and shall have chamfer strips built into forms.

I. Level and align the structural or equipment bearing plates in accordance with the structural requirements and the recommendations of the equipment manufacturer.

J. Equipment shall be supported during alignment and installation of grout by shims, wedges, blocks, or other approved means. The shims, wedges, and blocking devices shall be prevented from bonding to the grout by appropriate bond breaking coatings and removed after grouting unless otherwise approved by the Engineer.

3.02 INSTALLATION – GENERAL

A. Mix, apply, and cure products in strict compliance with the manufacturer's recommendations and this Section.

B. Have sufficient manpower and equipment available for rapid and continuous mixing and placing. Keep all necessary tools and materials ready and close at hand.

C. Maintain temperatures of the foundation plate, supporting concrete, and grout between 40 and 90 degrees F during grouting and for at least 24 hours thereafter or as recommended by the grout manufacturer, whichever is longer. Take precautions to minimize differential heating or cooling of baseplates and grout during the curing period.

D. Take special precautions for hot weather or cold weather grouting as recommended by the manufacturer when ambient temperatures and/or the temperature of the materials in contact with the grout are outside of the 60 and 90 degrees F range.

E. Install grout in a manner which will preserve the isolation between the elements on either side of the joint where grout is placed in the vicinity of an expansion or control joint.

F. Reflect all existing underlying expansion, control, and construction joints through the grout.

3.03 INSTALLATION – NONSHRINK CEMENTITIOUS GROUTS

A. Mix in accordance with manufacturer's recommendations. Do not add cement, sand, pea gravel, or admixtures without prior approval by the Engineer.

B. Avoid mixing by hand. Mixing in a mortar mixer (with moving blades) is recommended. Pre-wet the mixer and empty excess water. Add premeasured amount of water for mixing, followed by the grout. Begin with the minimum

amount of water recommended by the manufacturer and then add the minimum additional water required to obtain workability. Do not exceed the manufacturer's maximum recommended water content.

C. Placements greater than 3 inches in depth shall include the addition of clean, washed pea gravel to the grout mix when approved by the manufacturer. Comply with the manufacturer's recommendations for the size and amount of aggregate to be added.

D. Place grout into the designated areas in a manner which will avoid segregation or entrapment of air. Do not vibrate grout to release air or to consolidate the material. Placement should proceed in a manner which will ensure the filling of all spaces and provide full contact between the grout and adjoining surfaces. Provide grout holes as necessary.

E. Place grout rapidly and continuously to avoid cold joints. Do not place cement grouts in layers. Do not add additional water to the mix (retemper) after initial stiffening.

F. Just before the grout reaches its final set, cut back the grout to the substrate at a 45-degree angle from the lower edge of bearing plate unless otherwise approved by the Engineer. Finish this surface with a wood float (brush) finish.

G. Begin curing immediately after form removal, cutback, and finishing. Keep grout moist and within its recommended placement temperature range for at least 24 hours after placement or longer if recommended by the manufacturer. Saturate the grout surface by use of wet burlap, soaker hoses, ponding, or other approved means. Provide sunshades as necessary. If drying winds inhibit the ability of a given curing method to keep grout moist, erect wind breaks until wind is no longer a problem, or curing is finished.

3.04 INSTALLATION – NONSHRINK EPOXY GROUTS

A. Mix in accordance with the procedures recommended by the manufacturer. Do not vary the ratio of components or add solvent to change the consistency of the grout mix. Do not overmix. Mix full batches only to maintain proper proportions of resin, hardener, and aggregate.

B. Monitor ambient weather conditions and contact the grout manufacturer for special placement procedures to be used for temperatures below 60 or above 90 degrees F.

C. Place grout into the designated areas in a manner which will avoid trapping air. Placement methods shall ensure the filling of all spaces and provide full contact between the grout and adjoining surfaces. Provide grout holes as necessary.

D. Minimize "shoulder" length (extension of grout horizontally beyond base plate). In no case shall the shoulder length of the grout be greater than the grout thickness.

E. Finish grout by puddling to cover all aggregate and provide a smooth finish. Break bubbles and smooth the top surface of the grout in conformity with the manufacturer's recommendations.

F. Epoxy grouts are self curing and do not require the application of water. Maintain the formed grout within its recommended placement temperature range for at least 24 hours after placing, or longer if recommended by the manufacturer.

3.05 SCHEDULE

A. The following list indicates where the particular types of grout are to be used:

1. General purpose nonshrink cementitious grout: Use at all locations where nonshrink grout is called for on the plans except for base plates greater in area than 3 feet wide by 3 feet long and except for the setting of anchor rods, anchor bolts, or reinforcing steel in concrete.
2. Flowable nonshrink cementitious grout: Use under all base plates greater in area than 3 feet by 3 feet. Use at all locations indicated to receive flowable nonshrink grout by the Drawings. The Contractor, at his/her option and convenience, may also substitute flowable nonshrink grout for general purpose nonshrink cementitious grout.
3. Nonshrink epoxy grout: Use for the setting of anchor rods, anchor bolts, and reinforcing steel in concrete and for all locations specifically indicated to receive epoxy grout.

END OF SECTION

DIVISION 5

METALS

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SECTION 05500
MISCELLANEOUS METAL

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment, and incidentals required and install all miscellaneous metal complete as shown on the Drawings and as specified herein.

1.02 RELATED WORK

A. Section 03250, Concrete Joints and Joint Accessories.
B. Section 09900, Painting and Coating.

1.03 SUBMITTALS

The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance:

A. Submit to the Engineer shop drawings and product data showing materials of construction and details of installation for:

1. Shop drawings, showing sizes of members, method of assembly, anchorage, and connection to other members.

B. Samples

1. Submit samples as requested by the Engineer during the course of construction.

C. Design Data

1. Submit calculations sealed by a Professional Engineer registered in the State of Florida or submit load tables and test data demonstrating that the railings and their attachments will resist the loads specified in the 2014 FBC at the post spacing provided.
2. Submit manufacturer’s load and deflection tables for grating.

D. Test Reports

1. Certified copy of mill test reports on each aluminum proposed for use showing the physical properties and chemical analysis.

E. Certificates

1. Submit certification that the railing system is in compliance with OSHA requirements and the 2014 FBC.
2. Certify that welders have been qualified under AWS within the previous 12 months to perform the welds required under this Section.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to herein shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

A. Aluminum Association (AA)

1. AA ABH21—Aluminum Brazing Handbook.
2. AA ASD1—Aluminum Standards and Data.
3. AA DAF45—Designation System for Aluminum Finishes.
4. AA SAA46—Standards for Anodized Architectural Aluminum.

B. American Iron and Steel Institute (AISI)

1. AISI/ANSI/AISC 360—Specification for Structural Steel Buildings.

C. American Society for Testing and Materials (ASTM)

1. ASTM A36—Standard Specification for Carbon Structural Steel.
2. ASTM A48—Standard Specification for Gray Iron Castings.
3. ASTM A53—Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
4. ASTM A108—Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
5. ASTM A123—Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
6. ASTM A153—Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
7. ASTM A240—Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
8. ASTM A276—Standard Specification for Stainless Steel Bars and Shapes.

9. ASTM A307—Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 Psi Tensile Strength.
10. ASTM A500—Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
11. ASTM A501—Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
12. ASTM A536—Standard Specification for Ductile Iron Castings.
13. ASTM A992—Standard Test Method for Conducting Temperature Uniformity Surveys of Furnaces Used to Heat Treat Steel Products.
14. ASTM A1008—Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
15. ASTM A1011—Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
16. ASTM B209—Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
17. ASTM B221—Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles. and Tubes.
18. ASTM B429—Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
19. ASTM B695—Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
20. ASTM F593—Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
21. ASTM F1154—Standard Practices for Qualitatively Evaluating the Comfort, Fit, Function, and Durability of Protective Ensembles and Ensemble Components.
22. ASTM F1554—Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
23. ASTM F3125—Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1,040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions.

D. American Welding Society (AWS)

1. AWS D1.1—Structural Welding Code – Steel.
2. AWS D1.2—Structural Welding Code – Aluminum.
3. AWS D1.6—Structural Welding Code – Stainless Steel.

E. Federal Specifications (FS)

1. FS FF-B-575C—Bolt, Hexagon and Square.

F. Florida Building Code (FBC)

G. Military Specifications (MS)

1. MS MIL-E-15145—Enamel, Zinc Dust Pigmented, Fresh Water Tank Protective Formula No. 102.

H. Occupational Safety and Health Administration (OSHA)

1.06 QUALITY ASSURANCE

A. The work of this Section shall be completely coordinated with the work of other sections. Verify at the site both the dimensions and work of other trades adjoining items of work in this Section before fabrication and installation of items herein specified.

B. Furnish to the pertinent trades all items included under this Section that are to be built into the work of other sections.

C. All welding shall be performed by qualified welders and shall conform to the applicable AWS welding code. Welding of steel shall conform to AWS D1.1 and welding of aluminum shall conform to AWS D1.2.

1.07 WARRANTIES (NOT USED)

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver items to be incorporated into the work of other trades in sufficient time to be checked before installation.

B. Repair items which have become damaged or corroded to the satisfaction of the Engineer before incorporating them into the work.

1.09 QUALIFICATIONS (NOT USED)

1.10 TESTING REQUIREMENTS (NOT USED)

1.11 WEATHER CONSTRAINTS (NOT USED)

1.12 PROJECT/SITE REQUIREMENTS

A. Field measurements shall be taken at the site before fabrication of items to verify or supplement indicated dimensions and to ensure proper fitting of all items.

PART 2 PRODUCTS

2.01 GENERAL

A. The use of manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configuration desired.

B. Like items of materials shall be the end products of one manufacturer in order to provide standardization for appearance, maintenance, and manufacturer's service.

2.02 MATERIALS

A. Unless otherwise noted, materials for miscellaneous metals shall conform to the following standards:

1. Aluminum Extruded Shapes: ASTM B221, Alloy 6061 T6.

2. Aluminum Sheet and Plate: ASTM B209, Alloy 6061 T6.

3. Stainless Steel Plates, Sheets, and Structural Shapes:

   a. Exterior, Submerged, or Industrial Use: ASTM A240, Type 316 (Type 316L for welded).
   b. Interior and Architectural Use: ASTM A240, Type 304.

4. Stainless Steel Bolts, Nuts, and Washers: ASTM A276, Type 316.

2.03 ANCHORS, BOLTS, AND FASTENERS

A. Furnish anchors, bolts, fasteners, etc., as necessary for installation of the work of this Section or as specified for securing the work of other sections.

B. Type 316 stainless steel, wedge type anchors shall be used where they will be submerged or exposed to the weather or where stainless steel wedge type anchors are required. When the length or embedment of the bolt is not noted on the Drawings, provide length sufficient to place the wedge and expansion sleeve portion of the bolt at least 1 inch behind the concrete reinforcing steel. Expansion anchors shall be Hilti, Kwick-bolt III; ITW Ramset; Redhead trubolt; or equal.

C. Unless otherwise noted, adhesive anchors shall be a two-component chemical resin anchoring system. Capsules shall be self-contained, exactly premeasured amounts of polyester or vinyl ester resin, aggregate, and hardener. Stud assemblies shall consist of a stainless steel Type 316 all-thread anchor rod with nut and washer. Provide manufacturer’s recommended installation tools for installing

anchor components. Install anchors in full compliance with the manufacturer's recommendations. Adhesive anchor system shall be Hilti, HIT-RE 500-SD; Simpson Strong Tie, SET-XP Epoxy-Tie or Acrylic Tie; or approved equal.

D. Machine bolts and nuts shall conform to FS FF-B-575C. Bolts and nuts shall be hexagon type. Bolts, nuts, screws, washers, and related appurtenances shall be Type 316 stainless steel.

2.04 METAL GRATING

A. Grating shall have rectangular, 3/16 inch thick, bearing bars spaced 1-3/16 inches on center with cross bars spaced at 4 inches on center. All grating panels shall be banded with a bar the same size as the bearing bars.

1. Grating shall not exceed the fabricator's maximum recommended span, and meet or exceed the following load and deflection criteria for the maximum span length at the opening being covered by the grating.

   a. The grating shall produce a deflection of 1/360 of the span or less under a uniform live load of 100 pounds/square foot on the maximum span.
   b. The grating shall produce a deflection of 1/360 of the span or less under a concentrated live load of 300 pounds applied at the mid-point of the maximum span.

2. Openings 2 inches or greater in diameter/dimension and grating edges shall be banded with a bar of the same depth and thickness as the bearing bars. Cut bearing bars or cross bars shall be welded to the banding bar.

3. Grating clamps, nuts, bolts, washers, and other fastening devices for grating and grating supports shall be Type 316 stainless steel. All grating shall be anchored to the supporting system using saddle clips.

B. Aluminum grating material shall be aluminum alloy 6063-T6 with a mill finish. Cross bars shall be attached to the bearing bars with interlocked swaged joints. The grating shall be Type BS by IKG Borden, Houston, TX; Type 19 SG-4 by Ohio Gratings, Inc., Canton, OH; Type 19S4 by Seidelhuber Metal Products, San Carlos, CA; or equal.

C. Metal frames and supports for grating shall be of the same material as the grating unless otherwise shown on the Drawings. Where aluminum supports are used, they shall be fabricated from aluminum alloy 6061-T6.

2.05 RAILINGS

A. Guardrails and railing systems shall comply with the requirements of OSHA and the FBC and shall be custom pre-engineered, mechanically fastened, or welded pipe aluminum railing systems. Mechanically fastened railing system shall be TUFrail as provided by Thomson Fabrication Company or equal.

B. Rails and posts shall be 6061-T6, 6063-T6, or 6105-T5. Splice and reinforcing sleeves, brackets, end caps, toeboards, etc, shall be aluminum alloy 6061-T6, 6063-T6, or 6105-T5 alloy. Cast fittings shall be aluminum alloy No. 214. Railing system fastening hardware shall be Type 316 stainless steel. After welding, aluminum shall be anodized. All railing, posts, toeboards, and exposed aluminum shall be anodized with a clear architectural Class I satin finish providing a minimum coating thickness of 0.7 mils and a minimum coating weight of 32 milligrams per square inch in compliance with AA M10C22A41.

C. Railings shall be two-rail welded railing systems as shown on the Drawings, fabricated with 1 1/2-inch nominal diameter pipe. Posts shall be Schedule 80 pipe and railing shall be Schedule 40 pipe, minimum. Posts and top rails shall be continuous. The top surface of the top railing at all points, including corners and terminations, shall be smooth and shall not be interrupted by projected fittings or posts. Spacing of posts shall not exceed 5 feet on center and shall be uniformly spaced except as otherwise shown on the Drawings. Posts will be required on each side of structure expansion joints. All railing posts shall be vertical.

D. Welds shall be circumferential welds ground smooth and even to produce a railing that is neat in appearance and structurally sound. Welding methods shall be in conformity with AWS standards for the materials being joined. All rail to post connections shall be coped and fastened by continuous welds. There shall be no burrs, sharp edges, or protrusions on any weld on any part of the handrail system. After fabrication, the welds and surrounding area shall be cleaned and hand buffed to blend with the adjacent finish. All mechanical fasteners shall be unobtrusively located in countersunk holes with the top flush with the surface of the rail. Bends in the railing shall be as indicated by the Drawings. No distortion of the circular railing shape will be allowed. Bends and terminal sections shall be made without the use of fittings. Corner bends shall be mitered and welded bends.

E. Railing shall be assembled in sections as long as practical but shall not be greater than 24 feet in length. A field splice shall be used when an assembled section is to be attached to another section. Field splices shall be used in all railing panels that cross over structure expansion joints.

1. Field splices shall use internal splice sleeves located within 8 inches of railing posts. The sleeve shall be welded to the rail on one side and

fastened with a set screw to the rail on other side. The field splice shall be detailed to take the differential expansion between the railing system and the supporting structure.

2. When the field splice occurs in a railing panel crossing a structure expansion joint, the sleeve shall be welded to the rail on one side and be free to slide in the rail on other side. The field splice shall be detailed to take the same movement as the structure expansion joint.

F. The bases or supports for railing posts and handrail shall be the types indicated on the Drawings.

1. Where non-removable railing is set in concrete, the posts shall be placed in 2 1/2-inch-diameter formed concrete openings and firmly caulked with a nonsulphur compound, hydraulic cement equal to Por-Rok by Minwax Construction Products Division Sterling Drug, Montvale, NJ. Collars shall be placed around the post bases and fastened in place with set screws on the side of the post away from the walkway. Posts shall be placed with the centerline 4 inches from the edge of the concrete except that posts shall be set at the centerline of concrete curbs.
2. Aluminum railing posts, which may collect condensation, shall have a 3/16 inch drain hole drilled immediately above the concrete encased area, the base flange, or supporting socket on the side away from the walking area. The bottom of the rail post between the drain hole and the bottom of the post shall be filled with an inert material such as a compressed closed cell neoprene rod.

G. Toeboards shall be provided on all railing adjacent to a drop in elevation of 4 feet or more. Toeboards are not required on the inclined portion of stairway railings or where concrete or steel curbs, 4 inches or more in height, are present. Toeboards shall be 4-inch-high channels of the same material as the railing. The channels shall have a minimum thickness of 1/8-inch and have flanges of not less than 3/4-inch nor more than 1-1/2 inches in width. Toeboards shall be positioned with a maximum clearance of 1/4 incj from the floor and fastened to railing posts with 1/4 inch stainless steel U-bolts, with J-bolts at corner posts and with clip angles and two 1/4 inch stainless steel expansion bolts at walls. Toeboards shall not be welded to the posts. Connection to post shall allow expansion and contraction movements.

H. All railings shall be properly protected by paper, or by an approved coating, or by both against scratching, splashes, or mortar, paint, or other defacements during transportation and erection and until adjacent work by other trades has been completed. After protective materials are removed, the surfaces shall be made clean and free from stains, marks, or defects of any kind.

I. Aluminum shapes, including mounting brackets, in contact with concrete or a different type of metal shall be separated by a 1/32 inch neoprene gasket or provided with a heavy coating of protective zinc chromate for separation of dissimilar materials.

J. Safety gates for railing openings shall be fabricated of matching pipe and rail material and configuration. The gates shall be self-closing gates with approved stop, latch, and stainless steel closure spring and hinges.

2.06 MISCELLANEOUS ALUMINUM

A. All miscellaneous metal work shall be formed true to detail, with clean, straight, sharply defined profiles and smooth surfaces of uniform color and texture and free from defects impairing strength or durability. Holes shall be drilled or punched. Edges shall be smooth and without burrs. Fabricate supplementary pieces necessary to complete each item though such pieces are not definitely shown or specified.

B. Connections and accessories shall be of sufficient strength to safely withstand the stresses and strains to which they will be subjected. Exposed joints shall be close-fitting and jointed where least conspicuous. Threaded connections shall have the threads concealed where practical. Welded connections shall have continuous welds or intermittent welds as specified or shown. The face of welds shall be dressed flush and smooth. Welding shall be on the unexposed side as much as possible in order to prevent pitting or discoloration of the aluminum exposed surface. Grind smooth continuous welds that will be exposed. Provide holes for temporary field connections and for attachment of the work of other trades.

C. Miscellaneous aluminum items shall include: beams, angles, closure angles, grates, hatches, floor plates, stop plates, stair nosings, and any other miscellaneous aluminum called for on the Drawings and not otherwise specified.

D. Stair treads for aluminum stairs shall have abrasive non-slip nosing as approved.

E. Miscellaneous aluminum items shall have a cleaned and degreased mill finish.

2.07 MISCELLANEOUS STAINLESS STEEL

A. All miscellaneous metal work shall be formed true to detail, with clean, straight, sharply defined profiles and smooth surfaces of uniform color and texture, and free from defects impairing strength or durability. Holes shall be drilled or punched. Edges shall be smooth and without burrs. Fabricate supplementary pieces necessary to complete each item though such pieces are not definitely shown or specified.

B. Connections and accessories shall be of sufficient strength to safely withstand the stresses and strains to which they will be subjected. Exposed joints shall be close-fitting and jointed where least conspicuous. Threaded connections shall have the threads concealed where practical. Welded connections shall have continuous welds or intermittent welds as specified or shown. The face of welds shall be dressed flush and smooth. Grind smooth continuous welds that will be exposed. Provide holes for temporary field connections and for attachment of the work of other trades.

C. Miscellaneous stainless steel items shall include: beams, angles, bar racks, and any other miscellaneous stainless steel called for on the Drawings and not otherwise specified.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install all items except those to be embedded in concrete or other masonry which shall be installed under Division 3. Items to be attached to concrete or masonry after such work is completed shall be installed in accordance with the details shown. Fastening to wood plugs in masonry will not be permitted.

B. Abrasions in the shop primer shall be touched up immediately after erection. Areas left unprimed for welding shall be painted with primer after welding.

C. Specialty products shall be installed in accordance with the manufacturer's recommendations.

D. Expansion bolts shall be checked for tightness a minimum of 24 hours after initial installation.

E. Install adhesive capsule anchors using manufacture's recommended drive units and adapters and in compliance with the manufacturer's recommendations.

F. All railings shall be erected to line and plumb with tightly fitted joints proving smooth transitions. For mechanically fastened systems, provide gaps between connecting members no greater than 1/8 inch unless at designated expansion joints.

G. All steel and aluminum surfaces that come into contact with exposed concrete or masonry shall receive a protective coating of an approved heavy bitumastic troweling mastic applied in accordance with the manufacturer's instructions before installation.

H. Where aluminum contacts a dissimilar metal, apply a heavy brush coat of zinc-chromate primer followed by two coats of aluminum metal and masonry paint to the dissimilar metal.

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DIVISION 9

FINISHES

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SECTION 09900
PAINTING AND COATING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section includes materials for and application of painting and coating systems for the following surfaces:

1. Submerged metal.
2. Exposed metal.
3. Buried metal.
4. Concrete and masonry.
5. Metal in contact with concrete.

B. It does not include coating steel water tanks and reservoirs.

1.02 RELATED WORK

A. Section 15110, Manual, Check, and Process Valves.
B. Section 15155, Ductile Iron Pipe and Fittings.

1.03 SUBMITTALS

A. The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance.

B. Submit manufacturer's data sheets showing the following information:

1. Percent solids by volume.
2. Minimum and maximum recommended dry-film thickness per coat for prime, intermediate, and finish coats.
3. Recommended surface preparation.
4. Recommended thinners.
5. Statement verifying that the specified prime coat is recommended by the manufacturer for use with the specified intermediate and finish coats.
6. Application instructions including recommended equipment and temperature limitations.
7. Curing requirements and instructions.

C. Submit color swatches.

D. Submit certificate identifying the type and gradation of abrasives used for surface preparation.

E. Submit material safety data sheets (MSDSs) for each coating.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to in this Section shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

A. American Society for Testing and Materials (ASTM)

1. ASTM A780—Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
2. ASTM C501—Standard Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser.
3. ASTM D520—Standard Specification for Zinc Dust Pigment.
4. ASTM D522—Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings.
5. ASTM D1002—Standard Test Method for Apparent Shear Strength of Single-Lap-Joint Adhesively Bonded Metal Specimens by Tension Loading (Metal-to-Metal).
6. ASTM D2240—Standard Test Method for Rubber Property—Durometer Hardness.
7. ASTM D2697—Standard Test Method for Volume Nonvolatile Matter in Clear or Pigmented Coatings.
8. ASTM D3734—Standard Specification for High-Flash Aromatic Naphthas.
9. ASTM D4060—Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.
10. ASTM D4138—Standard Practices for Measurement of Dry Film Thickness of Protective Coating Systems by Destructive, Cross-Sectioning Means.
11. ASTM D4258—Standard Practice for Surface Cleaning Concrete for Coating.
12. ASTM D4260—Standard Practice for Liquid and Gelled Acid Etching of Concrete.
13. ASTM D4261—Standard Practice for Surface Cleaning Concrete Unit Masonry for Coating.

14. ASTM D4263—Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.
15. ASTM D4787—Standard Practice for Continuity Verification of Liquid or Sheet Linings Applied to Concrete Substrates.
16. ASTM D6386—Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting.
17. ASTM D7091—Standard Practice for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Metals and Nonmagnetic, Nonconductive Coatings Applied to Non-Ferrous Metals.
18. ASTM E84—Standard Test Method for Surface Burning Characteristics of Building Materials.

B. National Association of Corrosion Engineers International (NACE)

1. NACE SP0188—Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates.

C. Steel Structure Painting Council (SSPC)

1. SSPC PA-1—Shop, Field, and Maintenance Painting of Steel.
2. SSPC PA-2—Measurement of Dry Coating Thickness with Magnetic Gauges.
3. SSPC SP-1—Solvent Cleaning.
4. SSPC SP-2—Hand Tool Cleaning.
5. SSPC SP-3—Power Tool Cleaning.
6. SSPC SP-5—White Metal Blast Cleaning.
7. SSPC SP-6—Commercial Blast Cleaning.
8. SSPC SP-7—Brush-Off Blast Cleaning.
9. SSPC SP-10—Near-White Blast Cleaning.
10. SSPC SP-11—Power Tool Cleaning to Bare Metal.
11. SSPC SP-13—Surface Preparation of Concrete.

D. U.S. Department of Defense (MIL)

1. MIL-P-21035—Paint High Zinc Dust Content, Galvanizing Repair.

1.06 QUALITY ASSURANCE (NOT USED)

1.07 WARRANTIES

A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, for storing and protecting the items specified in this Section.

1.09 QUALIFICATIONS (NOT USED)

1.10 TESTING REQUIREMENTS (NOT USED)

1.11 MOCK-UP (NOT USED)

1.12 PROJECT REQUIREMENTS (NOT USED)

PART 2 MATERIALS

2.01 PAINTING AND COATING SYSTEMS

The following index lists the various painting and coating systems by service and generic type:

PAINT COATINGS SYSTEM INDEX		
No.	Title	Generic Coating
Submerged or Exposed Metal Coating Systems		
10.	Submerged or Exposed Metal, Corrosive Environment	High-build epoxy (two-coat system) with polyurethane topcoat
Buried Metal Coating Systems		
21.	Buried Metal	Epoxy
24.	Buried Metal	Corrosion-resisting grease
Concrete and Masonry Coating Systems		
36.	Exposed Concrete and Masonry, Corrosive Environment	High-build epoxy with polyurethane topcoat
Coating Systems for Miscellaneous Metals		
51.	Insulate Aluminum (Insulation) from Concrete and Carbon Steel	Bituminous

These systems are specified in detail in the following Paragraphs. For each coating, the required surface preparation, prime coat, intermediate coat (if required), topcoat, and coating thicknesses are described. Mil thicknesses shown are minimum dry-film thicknesses.

A. Submerged or Exposed Metal Coating Systems

1. System No. 10—Exposed Metal, Corrosive Environment:

a. Type: High-build epoxy intermediate coat having a minimum volume solids of 60%, with an inorganic zinc prime coat and a pigmented polyurethane finish coat having a minimum volume solids of 52%.

b. Service Conditions: For use with metal structures or pipes subjected to water condensation, chemical fumes such as hydrogen sulfide, salt spray, and chemical contact.

c. Surface Preparation: Solvent clean per SSPC-SP1 to remove contaminants from the surface. Abrasive blast per SSPC-SP-10, Near White Metal Blast Cleaning.

d. Prime Coat: Self-curing, two-component inorganic zinc-rich coating recommended by the manufacturer for overcoating with a high-build epoxy finish coat. Minimum zinc content shall be 12 pounds per gallon. Apply to a thickness of 3 mils. Products: Tnemec Series 90-97; Devoe Catha-Coat 304 or 304V; International Interzinc 180HS; Ameron 9HS; Carboline 11 HS; Sherwin-Williams Zinc-Clad II Plus, B69VZ12/B69VZ13/B69D11 at 2.5 to 4.0 mils DFT; PPG METALHIDE® 28 Inorganic Zinc-Rich Primer 97 – 672, or equal.

e. Intermediate Coat: Tnemec Series 104; ICI Devoe Devran 224 HS; International Interguard 760HS; Ameron 385; Carboline 888 or 890; Sherwin-Williams Macropoxy 646 B58-600/B58V600 at 4.0 to 8.0 mils DFT; PPG PITT-GUARD® Direct-to-Rust Epoxy Mastic Coating 97-145 Series, or equal; 5 mils. Film thickness 5.0 to 8.0 mils/coat. Minimum solids by volume should be 82%.

f. Finish Coat: Two-component pigmented acrylic or aliphatic polyurethane, minimum 70% sbv recommended by the manufacturer for overcoating a high-build epoxy coating. Apply to a thickness of at least 2 mils. Products: Tnemec Series 1075; ICI Devoe Devthane 379; International Interline 990HS; Ameron 450 HS; Carboline 134 HG; Sherwin-Williams Hi-Solids Polyurethane B65-300 Series/B60V30 at 2.5 to 4.0 mils DFT; PPG PITTHANE® Ultra-Gloss Urethane Enamel 95-812 Series; or equal.

B. Buried Metal Coating Systems

1. System No. 21—Buried Metal:

a. Type: High solids Cycloaliphatic Amine epoxy or phenolic epoxy having minimum volume solids of 80% (ASTM D2697).
b. Service Conditions: Buried metal, such as valves, flanges, bolts, nuts, structural steel, and fittings.
c. Surface Preparation: Solvent clean per SSPC-SP1 to remove contaminants from the surface. Abrasive blast per SSPC-SP-10, Near White Metal Blast Cleaning.
d. Coating System: Apply three or more coats of Ameron 400; Tnemec 104 HS (6.0 to 8.0 mils per coat); ICI Devoe Bar-Rust 233H; Carboline 890LT; Sherwin-Williams Tank Clad HS B62-80 Series/B60V80 Series at 5.0 to 8.0 mils/coat or equal; 30 mils total. Maximum thickness of an individual coating shall not exceed the manufacturer's recommendation.

2. System No. 24—Buried Metal:

a. Type: Corrosion-resisting grease.
b. Service Conditions: Buried metal, such as bolts, bolt threads, tie rods, and nuts.
c. Surface Preparation: Solvent clean per SSPC-SP1 to remove contaminants from the surface. Power Tool Clean per SSPC-SP3 as a minimum. Abrasive blasting per SSPC-SP-6, Commercial Blast Cleaning is preferred.
d. Coating: NO-OX-ID GG-2 as manufactured by Sanchem, Inc. Apply to a minimum thickness of 1/4 inch.

C. Concrete and Masonry Coating Systems

1. System No. 36—Exposed Concrete and Masonry, Corrosive Environment:

a. Type: High-build epoxy intermediate coat having minimum volume solids of 100% with an epoxy filler prime coat and a pigmented polyurethane finish coat.
b. Service Conditions: Concrete and masonry block exposed to corrosive atmospheres, such as hydrogen sulfide gas, chlorine gas, or chlorinated effluent sprays in wastewater treatment plants.
c. Surface Preparation: In accordance with Article 3.04. ICRI 3-5.
d. Prime Coat: Epoxy filler compound or epoxy masonry filler having a minimum solids volume of 60%. Apply one coat to fill voids, pores, and cracks. Products: Amerlock 400 BF; Tnemec 54-660;

International Intercryl 320WB; ICI Devoe Devran 265 BHF; Sentry 610; Sherwin-Williams Kem Cati-Coat HS B42 W400 Series/ B42V401 at 10.0 to 20.0 mils DFT; or equal.

e. Intermediate Coats: Ameron 385; Tnemec Series 434 Perma-Shield H_2S at 1/8 inch; International Interguard 760HS; ICI Devoe Devran 224 HS; Carboline 890LT; Sherwin-Williams Macropoxy 646 B58-600 Series/B60V80 at 5.0 to 8.0 mils DFT; or equal. Apply multiple coats to a total minimum thickness of 15 mils. Thickness of any single coat shall not exceed 6 mils.

f. Finish Coat: Two-component pigmented acrylic or aliphatic polyurethane recommended by the manufacturer for overcoating a high-build epoxy coating. Minimum volume of solids shall be 52%. Apply to a thickness of at least 2 mils. Products: Ameron 450 HS; Tnemec Series 435 Perma-Glaze at 15.0-20.0 mils DFT; International Interthane 990HS; ICI Devoe Devran 379; Carboline 134 HG; Sherwin-Williams Hi-Solids Polyurethane HS B65-300 Series/B60V30 at 3.0-4.0 mils DFT; or equal.

D. Coating Systems for Miscellaneous Metals

1. System No. 51—Insulate Aluminum (Insulation) from Concrete and Carbon Steel:

a. Type: Bituminous paint having a minimum volume solids of 68% coal-tar pitch based.

b. Service Conditions: Coat areas of aluminum grating, stairs, structural members or aluminum fabrications, in contact with concrete or carbon steel with this system.

c. Surface Preparation: Solvent or steam clean in accordance with SSPC SP-1; do not use alkali cleaning. Then dust blast.

d. Prime Coat: Apply synthetic resin or epoxy primer to metal surface before finish coats. Products: International Intervinux VTA528/529, or equal. No primer required for Carboline or Tnemec.

e. Finish Coat: Carboline Super Service Black; Tnemec 46-465; International Intertuf 100; or equal. Apply two coats to a minimum dry-film thickness of 8.0 to 12.0 mils/coat.

E. Abrasives for Surface Preparation

1. Abrasives used for preparation of ferrous (excluding stainless steel) surfaces shall be one of the following:

a. 16- to 30- or 16- to 40-mesh silica sand or mineral grit.

b. 20- to 40-mesh garnet.
c. Crushed iron slag, 100% retained on No. 80 mesh.
d. SAE Grade G-40 or G-50 iron or steel grit.

2. Abrasives used for preparation of stainless steel surfaces shall be 20- to 40-mesh silicon carbide or aluminum oxide.

3. Abrasives used for preparation of copper and aluminum surfaces shall be one of the following:

a. Crushed slag, 80 to 100 mesh.
b. Very fine silica sand, 80 to 100 mesh.

4. Abrasives used for preparation of concrete and masonry surfaces shall be 16- to 30- or 16- to 40-mesh silica sand.

5. In the above gradations, 100% of the material shall pass through the first stated sieve size and 100% shall be retained on the second stated sieve size.

PART 3 EXECUTION

3.01 WEATHER CONDITIONS

A. Do not paint in the rain, wind, snow, mist, or fog or when steel or metal surface temperatures are less than 5°F above the dew point.

B. Do not apply paint when the relative humidity is above 85%.

C. Do not paint when temperature of metal to be painted is above 120°F.

D. Do not apply alkyd, inorganic zinc, silicone aluminum, or silicone acrylic paints if air or surface temperature is below 40°F or expected to be below 40°F within 24 hours.

E. Do not apply epoxy, acrylic latex, and polyurethane paints on an exterior or interior surface if air or surface temperature is below 60°F or expected to drop below 60°F in 24 hours.

3.02 SURFACE PREPARATION PROCEDURES

A. Remove oil and grease from metal surfaces in accordance with SSPC SP-1. Use clean cloths and cleaning solvents and wipe dry with clean cloths. Do not leave a

film or greasy residue on the cleaned surfaces before abrasive blasting. Powerwashing with a biodegradable degreaser is also acceptable.

B. Remove weld spatter and weld slag from metal surfaces and grind smoothly rough welds, beads, peaked corners, and sharp edges including erection lugs in accordance with SSPC SP-2 and SSPC SP-3. Grind 0.020 inch (minimum) off the weld caps on pipe weld seams. Grind outside sharp corners, such as the outside edges of flanges, to a minimum radius of 1/4 inch.

C. Do not abrasive blast or prepare more surface area in one day than can be coated in one day; prepare surfaces and apply coatings the same day. Remove sharp edges, burrs, and weld spatter. Prime all areas before rust bloom forms and within the same day.

D. Do not abrasive blast PVC, CPVC, or FRP piping or equipment. Do not abrasive blast epoxy- or enamel-coated pipe that has already been factory coated, except to repair scratched or damaged coatings.

E. For carbon steel, do not touch the surface between the time of abrasive blasting and the time the coating is applied. Apply coatings within 2 hours of blasting or before any rust bloom forms.

F. Surface preparation shall conform to the SSPC specifications as follows:

Solvent Cleaning	SP-1
Hand Tool Cleaning	SP-2
Power Tool Cleaning	SP-3
White Metal Blast Cleaning	SP-5
Commercial Blast Cleaning	SP-6
Brush-Off Blast Cleaning	SP-7
Pickling	SP-8
Near-White Blast Cleaning	SP-10
Power Tool Cleaning to Bare Metal	SP-11
Surface Preparation and Cleaning of Steel and Other Hard Materials by High- and Ultrahigh-Pressure Water Jetting Before Recoating	SP-12
Surface Preparation of Concrete	SP-13

G. Wherever the words “solvent cleaning,” “hand tool cleaning,” “wire brushing,” or “blast cleaning” or similar words are used in these Specifications or in the paint manufacturer’s specifications, they shall be understood to refer to the applicable

SSPC (Steel Structure Painting Council), surface preparation specifications listed above.

H. *Dust blasting* is defined as cleaning the surface through the use of very fine abrasives, such as siliceous or mineral abrasives, 80 to 100 mesh. Apply a fine etch to the metal surface to clean the surface of any contamination or oxide and to provide a surface profile for the coating.

I. *Brush-off blasting* of concrete and masonry surfaces is defined as opening subsurface holes and voids and etching the surface for a coating to bond.

J. For carbon steel surfaces, after abrasive blast cleaning, the height of the surface profile shall be 2 to 3 mils. Verify the surface profile by measuring with an impresser tape acceptable to the Owner's Representative. Perform a minimum of one test per 100 square feet of surface area. Testing shall be witnessed by the Owner's Representative. The impresser tape used in the test shall be permanently marked with the date, time, and locations where the test was made. Test results shall be promptly presented to the Owner's Representative.

K. Do not apply any part of a coating system before the Owner's Representative has reviewed the surface preparation. If coating has been applied without this review, if directed by the Owner's Representative, remove the applied coating by abrasive blasting and reapply the coat in accordance with this Specification.

3.03 ABRASIVE BLAST CLEANING

A. Use dry abrasive blast cleaning for metal surfaces. Do not use abrasives in automatic equipment that have become contaminated. When shop or field blast cleaning with handheld nozzles, do not recycle or reuse blast particles.

B. After abrasive blast cleaning and before coating is applied, dry clean surfaces to be coated by dusting, sweeping, and vacuuming to remove residue from blasting. Apply the specified primer or touch-up coating within an 8-hour working day. Do not apply coating over damp or moist surfaces. Reclean any blast-cleaned surface not coated within the 8-hour period before applying primer or touch-up coating.

C. Keep the area of the work in a clean condition and do not permit blasting particles to accumulate and constitute a nuisance or hazard.

D. During abrasive blast cleaning, prevent damage to adjacent coatings. Schedule blast cleaning and coating so that dust, dirt, blast particles, old coatings, rust, mill scale, etc., will not damage or fall upon wet or newly coated surfaces.

3.04 PREPARATION OF CONCRETE AND MASONRY SURFACES TO BE COATED

A. Surface preparation of concrete and masonry surfaces shall be in accordance with SSPC SP-13/NACE 6 and the following.

B. Do not apply coating until concrete has cured at least 30 days at 75ºF and a minimum 50%. Do not use curing compound on surfaces that are to be coated.

C. Concrete and masonry surfaces on which coatings are to be applied shall be of even color, gray or gray-white. The surface shall have no pits, pockets, holes, or sharp changes of surface elevation. Scrubbing with a stiff-bristle fiber brush shall produce no dusting or dislodging of cement or sand. Sprinkling water on the surface shall produce no water beads or standing droplets. Concrete and masonry shall be free of laitance and slick surfaces.

D. Detergent clean the concrete or masonry surface with Trisodium Phosphate in accordance with ASTM D4258. Then sandblast surfaces (brush-off blast). Floor slabs may be acid etched as specified in ASTM D4260 in lieu of sandblasting. After sandblasting, wash surfaces with water to remove dust and salts in accordance with ASTM D4258 or D4261. The grain of the concrete surface to touch shall not be rougher than that of No. 10 mesh sand. Use International Concrete Repair Institute (ICRI) standards for concrete and masonry surface preparation.

E. Before coating concrete, plaster, and masonry with System No. 36, determine the presence of capillary moisture in accordance with ASTM D4263, except as modified below. Tape a 4-foot-by-4-foot sheet of polyethylene plastic to the concrete surface to be coated. Allow the plastic sheet to remain in place at least 24 hours. After the specified time has elapsed, remove the plastic sheet and visually examine both the underside of the plastic sheet and the concrete surface beneath it. There shall be no indication of moisture on either surface. If moisture is indicated, allow additional curing time for the concrete and then retest. Provide one test sheet for every 500 square feet of concrete surface to be coated. For walls, provide one test sheet for each 10 feet (or fraction thereof) of vertical rise in all elevations starting within 12 inches of the floor or base slab.

F. Acceptance criteria for concrete surfaces shall be in accordance with SSPC SP-13, Table 1, “Severe Service.”

G. Do not apply coatings to concrete when the concrete is outgassing. Apply coatings only when the concrete surface temperature is stable, not rising. Apply concrete coatings when the temperature is falling to reduce the potential of outgassing.

3.05 PAINTING SYSTEMS

A. All materials of a specified painting system, including primer, intermediate coats, and finish coats, shall be produced by the same manufacturer. Thinners, cleaners, driers, and other additives shall be as recommended by the paint manufacturer for the particular coating system.

B. Deliver paints to the jobsite in the original, unopened containers.

3.06 PAINT STORAGE AND MIXING

A. Store and mix materials only in areas designated for that purpose by the Owner's Representative. The area shall be well ventilated, with precautionary measures taken to prevent fire hazards. Post "No Smoking" signs. Storage and mixing areas shall be clean and free of rags, waste, and scrapings. Tightly close containers after each use. Store paint at an ambient temperature from 50°F to 100°F.

B. Prepare multiple-component coatings using all of the contents of the container for each component as packaged by the paint manufacturer. Do not use partial batches. Do not use multiple-component coatings that have been mixed beyond their pot life. Provide small quantity kits for touch-up painting and for painting other small areas. Mix only the components specified and furnished by the paint manufacturer. Do not intermix additional components for reasons of color or otherwise, even within the same generic type of coating.

3.07 PROCEDURES FOR THE APPLICATION OF COATINGS

A. Conform to the requirements of SSPC PA-1. Follow the recommendations of the coating manufacturer, including the selection of spray equipment, brushes, rollers, cleaners, thinners, mixing, drying time, temperature and humidity of application, and safety precautions.

B. Stir, strain, and keep coating materials at a uniform consistency during application. Power mix components. For multiple component materials, premix each component before combining. Apply each coating evenly, free of brush marks, sags, runs, and other evidence of poor workmanship. Use a different shade or tint on succeeding coating applications to indicate coverage where possible. Finished surfaces shall be free from defects or blemishes.

C. Do not use thinners unless recommended by the coating manufacturer. If thinning is allowed, do not exceed the maximum allowable amount of thinner per gallon of coating material. Stir coating materials at all times when adding thinner. Do not flood the coating material surface with thinner before mixing. Do not reduce

coating materials more than is absolutely necessary to obtain the proper application characteristics and to obtain the specified dry-film thicknesses.

D. Remove dust, blast particles, and other debris from blast cleaned surfaces by dusting, sweeping, and vacuuming. Allow ventilator fans to clean airborne dust to provide good visibility in working area before applying coating. Remove dust from coated surfaces by dusting, sweeping, and vacuuming before applying succeeding coats.

E. Apply coating systems to the specified minimum dry-film thicknesses as determined in accordance with SSPC PA-2.

F. Apply primer immediately after blast cleaning and before any surface rusting occurs, or any dust, dirt, or any foreign matter has accumulated. Before applying coating, re-clean surfaces that have surface colored or become moist by blast cleaning.

G. Apply a brush coat of primer on welds, sharp edges, nuts, bolts, and irregular surfaces before applying the primer and finish coat. Apply the brush coat before and in conjunction with the spray coat application. Apply the spray coat over the brush coat.

H. Before applying subsequent coats, allow the primer and intermediate coats to dry for the minimum curing time recommended by the manufacturer. In no case shall the time between coats exceed the manufacturer's recommendation.

I. Each coat shall cover the surface of the preceding coat completely and there shall be a visually perceptible difference in applied shade or tint of colors.

J. Applied coating systems shall be cured at 75°F or higher for 48 hours. If temperature is lower than 75°F, curing time shall be in accordance with printed recommendations of the manufacturer, unless otherwise allowed by the Owner's Representative.

K. Assembled parts shall be disassembled sufficiently before painting or coating to ensure complete coverage by the required coating.

3.08 SURFACES NOT TO BE COATED

A. Do not paint the surfaces listed below unless otherwise noted in the drawings or in other Specification sections. Protect the following surfaces during the painting of adjacent areas:

1. Concrete walkways.

2. Stainless steel.
3. Buried pipe, unless specifically required in the piping specifications.
4. Aluminum handrail, stairs, and grating.

3.09 PROTECTION OF SURFACES NOT TO BE PAINTED

A. Remove, mask, or otherwise protect hardware, lighting fixtures, switch plates, aluminum surfaces, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not intended to be painted. Provide drop cloths to prevent paint materials from falling on or marring adjacent surfaces. Protect working parts of mechanical and electrical equipment from damage during surface preparation and painting process. Mask openings in motors to prevent paint and other materials from entering the motors.

3.10 SURFACES TO BE COATED

A. The exact coating to be applied in any location is not designated by the descriptive phrases in the coating system titles such as “corrosive environment,” “buried metal,” or “submerged metal.” Coat surfaces with the specific coating systems as described below:

1. Coat aboveground and exposed piping or piping in vaults and structures as described as shown in the Piping Schedule in the drawings. The color of the finish coat shall be as shown in the Piping Schedule in the Drawings.
2. Coat submerged ductile iron piping and piping in wet wells as specified in System No. 10.
3. Coat valves as described the same as the adjacent piping. Aboveground valves, or valves in vaults and structures, shall match the color of the connecting piping.
4. Coat concrete surfaces where shown in the drawings.
5. Coat masonry surfaces where shown in the Drawings. Apply System No. 36 on exposed exterior masonry, System No. 36 on exposed interior masonry unless otherwise shown in the Drawings.
6. Coat aluminum surfaces in contact with concrete as specified in System No. 51.
7. Coat buried flanges, nuts and bolts, valves, flexible pipe couplings, exposed rebar in thrust blocks, and valve boxes as specified in System No. 21. Coat buried bolt threads, tie bolt threads, and nuts as specified in System No. 24.

3.11 DRY-FILM THICKNESS TESTING

A. Measure coating thickness specified for carbon steel surfaces with a magnetic-type dry-film thickness gauge in accordance with SSPC PA-2. Provide

certification that the gauge has been calibrated by a certified laboratory within the past 6 months. Provide dry-film thickness gauge as manufactured by Mikrotest or Elcometer.

B. Test the finish coat of metal surfaces (except zinc primer and galvanizing) for holidays and discontinuities with an electrical holiday detector, low-voltage, wet-sponge type. Provide measuring equipment. Provide certification that the gauge has been calibrated by a certified laboratory within the past 6 months. Provide detector as manufactured by Tinker and Rasor or K-D Bird Dog.

C. Measure coating thickness specified for concrete or masonry surfaces in accordance with ASTM D4138. Test the finish coat of concrete and masonry surfaces in accordance with NACE SP0188 or ASTM D4787. Patch coatings at the points of thickness measurement or holiday detection.

D. Check each coat for the correct dry-film thickness. Do not measure within 8 hours after application of the coating.

E. For metal surfaces, make five separate spot measurements (average of three readings) spaced evenly over each 100 square feet of area (or fraction thereof) to be measured. Make three readings for each spot measurement of either the substrate or the paint. Move the probe or detector a distance of 1 to 3 inches for each new gauge reading. Discard any unusually high or low reading that cannot be repeated consistently. Take the average (mean) of the three readings as the spot measurement. The average of five spot measurements for each such 100-square-foot area shall not be less than the specified thickness. No single spot measurement in any 100-square-foot area shall be less than 80% nor more than 120% of the specified thickness. One of three readings which are averaged to produce each spot measurement may underrun by a greater amount as defined by SSPC PA-2.

F. For concrete surfaces, make five separate spot measurements spaced evenly over each 100 square feet of area (or fraction thereof) to be measured. The average of five spot measurements for each such 100square-foot area shall not be less than the specified thickness. No single spot measurement in any 100-square-foot area shall be less than 80% nor more than 120% of the specified thickness.

G. Perform tests in the presence of the Owner’s Representative.

3.12 REPAIR OF IMPROPERLY COATED SURFACES

A. If the item has an improper finish color or insufficient film thickness, clean and topcoat the surface with the specified paint material to obtain the specified color and coverage. Sandblast or power-sand visible areas of chipped, peeled, or

abraded paint, feathering the edges. Then prime and finish the coat in accordance with the Specifications. The work shall be free of runs, bridges, shiners, laps, or other imperfections.

3.13 CLEANING

A. During the work, remove discarded materials, rubbish, cans, and rags at the end of each day's work.

B. Thoroughly clean brushes and other application equipment at the end of each period of use and when changing to another paint or color.

C. Upon completion of painting work, remove masking tape, tarps, and other protective materials, using care not to damage finished surfaces.

END OF SECTION

DIVISION 15

MECHANICAL

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SECTION 15055
PIPING SYSTEMS—GENERAL

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Specification describes responsibilities and requirements for Piping Systems including the following:

1. Labor, materials, tools, equipment, and services to be furnished in accordance with the provisions of the Contract Documents. The materials to be used for the piping systems shown in the Drawings are listed by service in the Piping Schedule, included in the Contract Drawings.
2. Coordination of work with other trades.
3. Furnishing and installing all supplementary or miscellaneous items, appurtenances, and devices incidental to or necessary for a sound, secure, and complete installation, although such work is not specifically indicated.
4. Furnishing Record Drawings and documents for piping systems.

1.02 RELATED WORK

A. Section 01300, Contract Administration.
B. Section 01330, Submittals and Acceptance.
C. Section 01650, Delivery, Storage, and Handling.
D. Section 09900, Painting and Coating.
E. Section 15155, Ductile Iron Pipe and Fittings.

1.03 SUBMITTALS

The Contractor shall submit the following in accordance with Section 01330, Submittals and Acceptance:

A. If the Contractor deviates from the piping layout as shown on the Contract Drawings, the Contractor shall submit scaled piping drawings showing locations and dimensions to and from fittings, valves, tanks, equipment, structures, and related appurtenances. Provide scaled drawings to a minimum scale of 1 inch equals 10 feet. Provide details to minimum scale of 1/8 inch equals 1 foot. Elevations shall correspond to reference vertical elevation datum shown or provided for this project.

B. Copies of any manufacturer's written directions regarding material handling, delivery, storage, and installation.

C. Record piping Drawings shall meet the requirements of Section 01300, Contract Administration, and Section 01785, Record Documents. During the work, the Contractor shall maintain accurate, up-to-date Record Drawings of piping systems installed in the project, including pre-existing piping discovered, relocated, or at locations other than as originally shown on the Drawings. When the work is completed and accepted by the Owner and the Engineer, the Contractor shall submit Record Drawings in accordance with Section 01785, Record Documents. The Contractor shall identify complete location, elevations, and description of piping systems. Piping systems and fittings are to be identified from three points on structures and/or stationary appurtenances.

D. Submit copies of forms documenting required field pressure testing work and results.

E. Submit certified copies of mill test reports for bolts and nuts, including coatings if specified. Provide recertification by an independent domestic testing laboratory for materials originating outside of the United States.

F. Submit manufacturer's data sheet for gaskets supplied showing dimensions and bolting recommendations.

G. Support Systems:

1. Drawings of each piping system locating each support, guide, and anchor.
2. Identify support, guide, and anchor type by catalog number and shop/ Contract Drawing detail number.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to in this Section shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

A. American National Standards Institute (ANSI)

1. ANSI A21.11—Rubber Gasket Joints for Cast Iron and Ductile Pressure Pipe and Fittings.
2. ANSI B1.1—Unified Inch Screw Threads.
3. ANSI B2.1—Pipe Threads.
4. ANSI B16.21—Nonmetallic Gaskets for Pipe Flanges.

5. ANSI B18.2.1—Square and Hex Bolts and Screws, Including Askew Head Bolts, Hex Cap Screws, and Lag Screws.
6. ANSI B18.2.2—Square and Hex Nuts.
7. ANSI B31.3—Process Piping.

B. American Society of Mechanical Engineers (ASME)

1. ASME B31.1—Power Piping (Pressure Piping).
2. ASME Boiler and Pressure Vessel Code.

C. American Society for Testing and Materials (ASTM)

1. ASTM A183—Specification for Carbon Steel Track Bolts and Nuts.
2. ASTM A193—Standard Specification for Alloy-Steel; and Stainless Steel Bolting Materials for High Temperature or High Pressure Service and other Special Purpose Applications.
3. ASTM A194—Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service.
4. ASTM A307—Specification for Carbon Steel Externally Threaded Standard Fasteners.
5. ASTM D1330—Standard Specification for Rubber Sheet Gaskets.
6. ASTM F467—Standard Specification for Nonferrous Nuts for General Use.

D. American Water Works Association (AWWA)

1. AWWA C207—Steel Pipe Flanges for Waterworks Service-Sizes 4-Inch through 144-Inch.

E. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS)

1. MSS SP 58—Pipe Hangers and Supports – Material, Design, and Manufacture.

F. NSF International (NSF)

1. NSF 61—Drinking Water System Components – Health Effects.

1.06 QUALITY ASSURANCE (NOT USED)

1.07 WARRANTIES

A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, for storing and protecting the items specified in this Section.

B. The Contractor shall protect the pipe from kinks, cuts, end damage, and other defects when transporting all piping. Binding and tie-down methods shall not damage or deflect the pipes in any way. Pipe damaged during shipment shall be rejected.

C. Pipe shall be stored on level ground, preferably turf or sand, free of sharp objects that could damage the pipe. Stacking of any pipe shall be limited to a height that will not cause excessive deformation of the lower layers of pipe under anticipated temperature conditions. When necessary due to ground conditions, the pipe shall be stored on wooden sleepers, spaced suitably and of such widths to not allow deformation of the pipe at the point of contact with the sleeper or between supports. Pipe shall not be removed from storage until bedding or sub-grade work is complete and ready to receive the pipe.

D. Pipe shall be handled in such a manner that the pipe is not damaged by dragging it over sharp and cutting objects. Ropes, fabric, or rubber-protected slings and straps shall be used when handling pipe. Chains, cables, or hooks inserted into the pipe ends shall not be used. Two slings spread apart shall be used for lifting each length of pipe. Pipe or fittings shall not be dropped. Slings for handling joined pipe shall not be positioned at socket-welded joints. Sections of the pipes with cuts and gouges shall be removed and the ends of the pipe rejoined. In accordance with the pipe manufacturer’s written instructions, the Contractor shall repair all pipe with damaged linings and pipe exterior coatings that have been damaged before the pipe is installed.

E. The Contractor shall cover all pipe stored on the site with canvas or other opaque material to protect it from sunlight. Provide air circulation under the covering.

F. The Contractor shall inspect all pipe, fittings, and other accessories upon delivery and during the work. Any defective or damaged materials found during field inspection or during tests shall be removed from the site and replaced by, and at the expense of, the Contractor.

G. The interior of all pipe, fittings, and other accessories shall be kept free from dirt and foreign matter at all times. Fittings shall be drained and stored in a manner that will protect them from damage by freezing.

H. Gaskets shall be placed in a cool location out of direct sunlight. Gaskets shall not come in contact with petroleum products. Gaskets shall be used on a first-delivered-to-site and first-to-be-installed rotation basis. Mechanical-joint glands, bolts, and washers shall be handled and stored in a manner that will ensure proper use with respect to types and sizes.

1.09 QUALIFICATIONS (NOT USED)

1.10 TESTING REQUIREMENTS (NOT USED)

1.11 MAINTENANCE (NOT USED)

1.12 OPERATIONS AND MAINTENANCE (O&M) MANUALS (NOT USED)

1.13 DEFINITIONS OF BURIED, EXPOSED, AND SUBMERGED PIPING

A. Buried piping is piping buried in soil, beneath a structure and/or encased in concrete. Where an exterior pipe coating is specified to be factory- or field-applied, the Contractor shall provide the coating up to the penetration of a structure. Piping encased in concrete does not require an exterior coating other than what is factory furnished.

B. Exposed piping is piping in any of the following conditions or locations:

1. Above ground.
2. Inside buildings, vaults, or other structures.
3. In underground concrete trenches or galleries.

C. Submerged piping is considered to be all piping within a liquid holding tank.

1.14 SYSTEM DESIGN REQUIREMENTS

A. General

1. The Specifications and Drawings are not all inclusive of explicit piping details; provide piping for intended use in compliance with laws and regulations, including ASME B31.1 Code (Power Piping).
2. Pressure ratings and materials specified represent minimum acceptable standards for piping systems.
3. Piping Systems: Suitable for the services specified and intended.
4. Piping shall be color coded in accordance with the Department of Environmental Protection requirements.

B. Support Systems

1. The absence of pipe supports and details on the Drawings shall not relieve the Contractor of responsibility for sizing and providing supports for this project.

2. Select and design within the specified spans and component requirements.

3. Comply with requirements of MSS SP 58, Pipe Hangers and Supports – Materials, Design, and Manufacture.

4. Criteria for structural design and selection of pipe support system components:

   a. Dead loads imposed by the weight of the pipes filled with water, within specified spans and component requirements, plus any insulation.
   b. Safety factor: Minimum of 5.

5. Design, size, and space support anchoring devices, including anchor bolts, inserts, and other devices used to anchor the support, to withstand the shear and pullout loads imposed by loading and spacing on each particular support.

   a. Piping smaller than 30 inches: Supports are shown only where specific types and locations are required; additional pipe supports may be required and are to be provided and installed by the Contractor at no additional cost to the Owner.

C. Adapters

1. No attempt has been made to show all adapters, spool pieces, reducers, bushings, or other fittings required to accommodate the connection of pipes, fittings, and valves of various joint design and sizes throughout the project. The Contractor is completely responsible for providing, at his expense, all adapters, reducers, sleeves, spool pieces, and other fittings and appurtenances necessary for connection of pipe (for the same pipe material of or a transition of pipe materials), valves, fittings, and appurtenances throughout the project, which shall be constructed of appropriate materials, coated and lined to match the materials, coatings, and linings specified for the connected components. All adapters, reducers, sleeves, spool pieces, and other fittings shall be coated and lined in accordance with the specifications for each individual pipe system.

D. Unions

1. No attempt has been made to show all unions required for the project. The Contractor shall provide unions at all connections of threaded pipe to installed equipment unless deleted by the Engineer, in writing, at certain locations. The unions shall meet or exceed the quality of materials, pressure rating, service, and painting requirements of connected piping.

PART 2 PRODUCTS

2.01 PIPING SYSTEM GENERAL REQUIREMENTS SCHEDULE

A. Unless noted otherwise in the Drawings, piping system materials, fittings, and appurtenances are subject to requirements of the individual Specifications for the piping systems.

2.02 PIPING SCHEDULE

A. A piping schedule listing the piping identification abbreviations, piping materials, operating pressures, field test pressures, lining systems, and color coding associated with the flow streams is provided on the Contract Drawings. In project locations where the piping system material referenced on the piping schedule is not appropriate, the required piping material is indicated on the Contract Drawings. Materials called out in the Contract Drawings shall govern over materials stated in the piping schedule.

2.03 THREAD FORMING FOR STAINLESS STEEL BOLTS

A. Form threads for stainless steel bolts by rolling, not by cutting or grinding.

2.04 BOLTS AND NUTS FOR FLANGES FOR DUCTILE IRON PIPE FLANGES

A. Bolts, washers, and nuts for pipe installed indoors, outdoors above and below ground, and in vaults and structures shall be as specified in Section 15155, Ductile Iron Pipe and Fittings.

B. Bolts, washers, and nuts for submerged Class 150 flanges shall be Type 304 stainless steel conforming to ASTM A193 (Grade B8) for bolts and ASTM A194 (Grade 8) for nuts. Fit shall be Class 2A conforming to ANSI B1.1 when connecting to cast-iron valves having body bolt holes.

2.05 LUBRICANT FOR STAINLESS STEEL BOLTS AND NUTS

A. Anti-seize thread lubricant shall be applied to the thread portion of all (above grade and below grade) stainless steel bolts (stainless steel tie rods, etc.) during assembly. Anti-seize lubricant shall be chloride free and shall be nongalling NSF approved. Anti-seize thread lubricant shall be Jet-Lube “Nikal,” John Crane “Thred Gard Nickel,” Never-Seez “Pure Nickel Special,” or Permatex “Nickel Anti-Seize.”

2.06 FLANGE GASKETS FOR DUCTILE IRON PIPE

A. Flange gaskets shall be in accordance with AWWA C207, except as modified in this Section. Gaskets shall be ring type. All gasket material shall be suitable for the fluid being conveyed and shall be resistant to free chlorine concentrations up to 10 mg/L. All gasket material shall be rated to the surge pressures listed in the pipe schedule. Gaskets shall be EPDM, Viton, or an approved equal.

2.07 FLANGE GASKETS FOR DUCTILE-IRON PIPE AND FITTINGS IN RAW SEWAGE

A. Gaskets shall be full face, 1/8-inch-thick Buna-N having a Brinell Hardness of 55 to 65 durometer A. Gaskets shall be suitable for a water pressure of 200 psi at a temperature of 250°F. Gaskets shall have "nominal" pipe size inside diameters, not the inside diameters indicated in ANSI B16.21. Provide Garlock Style 9122 or equal. The Contractor shall verify that the gaskets are compatible with all chemicals being used.

2.08 LOCATOR WIRE

A. All 2-inch and larger buried piping shall be laid with two insulated, 12-gauge minimum AWG, THWN strand copper wires taped with adhesive-backed tape or tied to the nonmetallic pipe at 5 feet on center for location purposes.

2.09 DETECTABLE PIPELINE MARKING TAPE

A. All buried non-metallic piping shall be laid with underground detectable caution tape, 2-inch tape for a maximum of 12-inch depth and 6-inch tape for a maximum of 24-inch depth.

PART 3 EXECUTION

3.01 PREPARATION

A. Field Alignment

1. The piping shown on the Contract Drawings is generally indicative of the work, with symbols and notations provided for clarity. However, the Contract Drawings are not an exact representation of all conditions involved; therefore, install piping to suit actual field conditions and measurements as approved by the Engineer. No extra compensation will be made for work due to differences between indicated and actual dimensions.
2. The Contractor shall install all adapters, fittings, flanged connections, closures, restrained joints, etc. not specified but necessary for a complete installation acceptable to the Engineer.
3. The Contract Drawings do not indicate all adapters, fittings, spool pieces, bushings, unions, supports, hangers, and other items required to accommodate the installing and connecting of pipe, fittings, valves, and equipment of various joint designs and sizes. Provide such required items of appropriate designs, materials, coatings, and linings.

3.02 FIELD LAYOUT AND MODIFICATIONS

A. Unless directed otherwise, the Contractor shall be responsible for setting construction layout stakes and/or offsets required to complete the designated work. The Contractor shall ensure that those stakes and/or offsets are protected and any re-staking required for any reason including work stoppage shall be included in the bid price and no additional compensation to the Contractor will be made.

B. The Engineer has the right to make any modifications the Engineer deems necessary due to field conditions, conflicts with other utilities, or to protect other properties.

3.03 PIPE PRODUCTS INSPECTION

A. The Contractor shall obtain from the pipe manufacturer a certificate of inspection to the effect that the pipe, fittings, gaskets, glands, bolts, and nuts supplied for this Contract have been inspected at the plant and that they meet the requirements of these specifications. The Contractor shall submit these certificates to the Engineer before installing the pipe materials. The Contractor shall visually inspect all pipe and fittings at delivery and before they are lowered into the trench to be installed. Pipe or fittings that do not conform to these Specifications or have been damaged

in any manner will be rejected and the Contractor must remove them immediately. The entire product of any plant may be rejected when, in the opinion of the Engineer, the methods or quality assurance and uniformity of manufacturer fail to secure acceptable and uniform pipe products or where the materials used produce inferior pipe products.

3.04 CUT-IN TO EXISTING MAIN

A. Prior to connecting to existing lines, the Contractor shall notify and coordinate all work with Owner's personnel. The Owner shall be responsible for turning valves. The Contractor shall be responsible for tying into existing mains, under the Owner Representative's supervision, during construction. Cut into and connect mains constructed under this Contract to existing mains at locations shown or as directed by the Engineer. Install cut-ins meeting conditions found in the field, with standard fittings as detailed or as directed by the Engineer. Provide sufficient fittings and operating equipment on the site before starting operations. Test and flush new lines as specified hereinafter and obtain approval of the Engineer before putting a connection to an existing line into service.

3.05 BURIED PIPING AND PIPE FITTINGS

A. Trenching and backfilling for all pipe and fittings shall also be in accordance with Section 02305, Earthwork for Utilities.

B. Installation

1. Inspect all piping for defects and remove all lumps or excess coatings before installation. The inside of the mechanical joint and outside of plain-end pipe shall be cleaned before joining pipe. Caution shall be taken to prevent damage to the pipe during lowering into the trench. Remove all foreign matter that has entered the pipe during storage and installation. The Contractor shall cover the pipe ends during installation to prevent debris from entering the pipe. No debris, tools, clothing, or other material shall be placed in the pipe.
2. After being placed in the trench, the pipe shall be brought to the proper line and grade by compacting the approved backfill material under it, except at the bell end. Joint deflection shall not exceed 75% of the manufacturer's limit.
3. The Contractor shall install temporary water-tight plugs on the pipe ends during the time that the pipe is in the trench but no work is in progress. If there is water in the trench upon beginning work, this plug shall remain in place until the trench has been pumped dry, unless otherwise approved by the Engineer, the Engineer's Representative, or the Owner's Representative.

4. Coat threaded portions of stainless steel bolts and nuts with lubricant before assembly.

3.06 FLANGED JOINTS FOR EXPOSED PIPE AND FITTINGS

A. When bolting flanged joints, the Contractor shall avoid restraint on the opposite end of the pipe or fitting, which would prevent uniform gasket compression or which would cause unnecessary stress in the flanges. One flange shall be free to move in any direction while the flange bolts are being tightened. Bolts shall be tightened gradually and at a uniform rate to ensure uniform compression of the gasket, in accordance with pipe and fitting manufacturer's recommendations.

B. Coat threaded portions of stainless steel bolts and nuts with lubricant before assembly.

3.07 ANCHORING AND RESTRAINING

A. Thrust blocks shall be used in new lines and shall be limited to areas in which a new fitting has been installed in an existing line and field restraining joints are not feasible or when directed by the Engineer.

3.08 FLUSHING, CLEANING, TESTING AND INSPECTION OF PIPING

A. See Section 15144, Pressure Testing of Piping, for the requirements of pipe flushing, cleaning, pressure testing, and inspection.

3.09 PIPE COLOR CODING

A. The pipe color shall be as identified on the Drawings. The Contractor shall coordinate with the Engineer and the Owner to generate a list of acceptable pipe colors for exposed piping systems. Where color-coding is achieved by painting exterior surfaces of the piping systems, painting shall be provided in accordance with Section 09900, Painting and Coating. On applicable pipes, color shall be in accordance with FDEP color-coding requirements.

END OF SECTION

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SECTION 15110
MANUAL, CHECK, AND PROCESS VALVES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment, and incidentals required, and install complete and ready for operation all valves as shown in the Drawings and as specified in this Section. All valves shall be complete with all necessary manual actuators, valve boxes, extension stems, and floor stands, which are required for proper valve operation and completion of the work.

1. All valves shall be of the sizes shown in the Drawings. All equipment of the same type shall be from one manufacturer, unless authorized in writing by the Engineer.

2. The valves shall include but not be limited to the following:

a. Plug Valves.

1.02 RELATED WORK

A. Section 01330, Submittals and Acceptance.
B. Section 09900, Painting and Coating.
C. Section 15055, Piping Systems—General.

1.03 SUBMITTALS

The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance:

A. Product technical submittal data shall contain the following information and data:

1. Acknowledgment that products submitted meet requirements of standards referenced.

2. Manufacturer’s installation instructions.

3. Manufacturer’s operation and maintenance manuals.

4. Data of valves, actuators, and accessories:

   a. Pressure and temperature rating.
   b. Materials of construction, with ASTM reference and grade.
   c. Linings and coatings.
   d. Dimensions and weight.
   e. Flow coefficient.
   f. Actuators and accessories details.
   g. Manufacturer's product brochure, cut-sheets, and parts diagrams.

B. Dimensions and orientation of valve actuators as installed on the valves. Show location of internal stops for gear actuators. State differential pressure and fluid velocity used to size actuators. For worm-gear actuators, state the radius of the gear sector in contact with the worm and state the handwheel diameter.

C. The following test reports: Performance Tests; Leakage Tests; Hydrostatic Tests; and Proof-of-Design Tests as applicable or required.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to in this Section shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

A. American National Standard Institute (ANSI)

1. ANSI A21.11—Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
2. ANSI B1.20.1—Pipe Threads, General Purpose (Inch).
3. ANSI B1.20.7—Hose Coupling Screw Threads (Inch).
4. ANSI B16.1—Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
5. ANSI B16.5—Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard.
6. ANSI B16.10—Face to Face and End-to-End Dimensions of Valves.
7. ANSI B16.18—Cast Copper Alloy Solder Joint Pressure Fittings.
8. ANSI B16.34—Valves Flanged, Threaded and Welding End.
9. ANSI B16.42—Ductile-Iron Pipe Flanges and Flanged Fittings, Classes 150 and 300.
10. ANSI B16.47—Large Diameter Steel Flanges: NPS 26 through NPS 60.
11. ANSI B16.104—Control Valve Seat Leakage.

12. ANSI B36.10—Welded and Seamless Wrought Steel Pipe.
13. ANSI B93.10—Static Pressure Rating Methods of Square Head Fluid Power Cylinders Part 1: Pressure Containing Components.
14. ANSI B93.15—Mounting Dimensions for Square Head Industrial Fluid Power Cylinders.
15. ANSI/NSF 61—Drinking Water System Components – Health Effects.

B. American Petroleum Institute (API)

1. API 6D—Pipeline Valves (Steel Gate, Plug, Ball, and Check Valves).
2. API 6FA—Specification for Fire Test for Valves.
3. API 594—Check Valves: Flanged, Lug, Wafer and Butt-Welding.
4. API 607—Testing of Valves – Fire Type-Testing Requirements.

C. American Society for Testing of Materials (ASTM)

1. ASTM A36—Standard Specification for Carbon Structural Steel.
2. ASTM A47—Standard Specification for Ferritic Malleable Iron Castings.
3. ASTM A48—Standard Specification for Gray Iron Castings.
4. ASTM A105—Standard Specification for Carbon-Steel Forgings for Piping Applications.
5. ASTM A108—Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
6. ASTM A126—Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
7. ASTM A148—Standard Specification for Steel Castings, High Strength, for Structural Purposes.
8. ASTM A181—Standard Specification for Carbon-Steel Forgings, for General-Purpose Piping.
9. ASTM A182—Standard Specification for Forged or Rolled Alloy and Stainless-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service.
10. ASTM A193—Standard Specification for Alloy-Steel and Stainless-Steel Bolting Materials for High-Temperature or High Pressure Service and Other Special Purpose Applications.
11. ASTM A194—Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High-Temperature Service, or Both.
12. ASTM A216—Standard Specification for Steel Castings, Carbon, Suitable for Fusion-Welding, for High-Temperature Service.
13. ASTM A240—Standard Specification for Chromium and Chromium-Nickel Stainless-Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
14. ASTM A269—Standard Specification for Seamless and Welded Austenitic Stainless-Steel Tubing for General Purpose.

15. ASTM A276—Standard Specification for Stainless-Steel Bars and Shapes.
16. ASTM A313—Standard Specification for Stainless-Steel Spring Wire.
17. ASTM A322—Standard Specification for Steel Bars, Alloy, Standard Grades.
18. ASTM A351—Standard Specification for Castings, Austenitic, for Pressure-Containing Parts.
19. ASTM A395—Standard Specification for Ferritic Ductile-Iron Pressure-Retaining Castings for Use at Elevated Temperatures.
20. ASTM A436—Standard Specification for Austenitic Gray Iron Castings.
21. ASTM A439—Standard Specification for Austenitic Ductile-Iron Castings.
22. ASTM A449—Standard Specification for Hex Cap Screws, Bolts and Studs, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use.
23. ASTM A276—Standard Specification for Stainless-Steel Bars and Shapes.
24. ASTM A479—Standard Specification for Stainless-Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels.
25. ASTM A494—Standard Specification for Castings, Nickel and Nickel Alloy.
26. ASTM A516—Standard Specification for Pressure Vessel Plates, Carbon-Steel, for Moderate- and Lower-Temperature Services.
27. ASTM A536—Standard Specification for Ductile-Iron Castings.
28. ASTM A564—Standard Specification for Hot-Rolled and Cold-Finished Age-Hardening Stainless-Steel Bars and Shapes.
29. ASTM A582—Standard Specification for Free-Machining Stainless-Steel Bars.
30. ASTM A666—Standard Specification for Annealed or Cold-Worked Austenitic Stainless-Steel Sheet, Strip, Plate, and Flat Bar.
31. ASTM A743—Standard Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application.
32. ASTM A744—Standard Specification for Castings, Iron-Chromium-Nickel, Corrosion Resistant, for Severe Service.
33. ASTM A890—Standard Specification for Castings, Iron-Chromium-Nickel-Molybdenum Corrosion-Resistant, Duplex (Austenitic/Ferritic) for General Application.
34. ASTM B16—Standard Specification for Free-Cutting Brass Rod, Bar and Shapes for Use in Screw Machines.
35. ASTM B21—Standard Specification for Naval Brass Rod, Bar, and Shapes.
36. ASTM B61—Standard Specification for Steam or Valve Bronze Fittings.
37. ASTM B62—Standard Specification for Composition Bronze or Ounce Metal Castings.
38. ASTM B98—Standard Specification for Copper-Silicon Alloy Rod, Bar and Shapes.

39. ASTM B99—Standard Specification for Copper-Silicon Alloy Wire for General Applications.
40. ASTM B127—Standard Specification for Nickel-Copper Alloy (UNS N04400) Plate, Sheet, and Strip.
41. ASTM B148—Standard Specification for Aluminum-Bronze Sand Castings.
42. ASTM B150—Standard Specification for Aluminum Bronze Rod, Bar, and Shapes.
43. ASTM B164—Standard Specification for Nickel-Copper Alloy Rod, Bar, and Wire.
44. ASTM A169—Standard Specification for Aluminum Bronze Sheet, Strip, and Rolled Bar.
45. ASTM B193—Standard Test Method for Resistivity of Electrical Conductor Materials.
46. ASTM B371-Standard Specification for Copper-Zinc-Silicon Alloy Rod.
47. ASTM B427—Standard Specification for Gear Bronze Alloy Castings.
48. ASTM B446—Standard Specification for Nickel-Chromium-Molybdenum-Columbium Alloy (UNS N06625), Nickel-Chromium-Molybdenum-Silicon Alloy (UNS N06219), and Nickel-Chromium-Molybdenum-Tungsten Alloy (UNS N06650) Rod and Bar.
49. ASTM B443—Standard Specification for Nickel-Chromium-Molybdenum-Columbium Alloy (UNS N06625) and Nickel-Chromium-Molybdenum-Silicon Alloy (UNS N06219) Plate, Sheet, and Strip.
50. ASTM B462—Specification for Forged or Rolled UNS N06030, N06022, N06035, N06200, N06059, N06686, N06020, N06024, N06026, N08367, N10276, N10665, N10675, N10629, N08031, N06045, N06025, and R20033 Alloy Pipe Flanges, Forged Fittings, & Values & Parts for Corrosive High-Temperature Service.
51. ASTM B463—Standard Specification for UNS N08020, UNS N08026, and UNS N08024 Alloy Plate, Sheet, and Strip.
52. ASTM B472—Standard Specification for Nickel Alloy Billets and Bars for Reforging.
53. ASTM B584—Standard Specification for Copper Alloy Sand Castings for General Applications.
54. ASTM B763—Standard Specification for Copper Alloy Sand Castings for Valve Applications.
55. ASTM D1248—Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable.
56. ASTM D2000—Standard Classification System for Rubber Products in Automotive Applications.
57. ASTM D4101—Standard Specification for Polypropylene Injection and Extrusion Materials.
58. ASTM F467—Standard Specification for Non-Ferrous Nuts for General Use.

59. ASTM F468—Standard Specification for Non-Ferrous Bolts, Hex Cap Screws, and Studs for General Use.

D. American Society of Mechanical Engineers (ASME)

1. ASME 16.5—Pipe Flanges and Flanged Fittings NPS 1/2 through NPS 24 Metric/Inch Standard.
2. ASME B16.11—Standards of Pipes and Fittings.
3. ASME B16.24—Cast Copper Alloy Pipe Flanges and Flanged Fittings Classes 150, 300, 400, 600, 900, 1500, and 2500.

E. American Society of Safety Engineers (ASSE)

1. ASSE 1011—Performance Requirements for Hose Connection Vacuum Breakers.

F. American Water Works Association (AWWA)

1. AWWA C110—Ductile-Iron and Gray-Iron Fittings for Water.
2. AWWA C111—Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
3. AWWA C115—Standard for Flanged Ductile-Iron Pipe with Threaded Flanges.
4. AWWA C207—Steel Pipe Flanges for Waterworks Service, Sizes 4-Inch through 144-Inch (100 mm through 3,600 mm).
5. AWWA C500—Metal-Seated Gate Valves for Water Supply Service.
6. AWWA C504—Rubber-Sealed Butterfly Valves.
7. AWWA C507—Ball Valves 6-Inch through 48-Inch (150 mm through 1200 mm).
8. AWWA C508—Swing-Check Valves for Waterworks Service, 2-Inch (50 mm) through 24-Inch (600 mm).
9. AWWA C509—Resilient-Seated Gate Valves for Water-Supply Service.
10. AWWA C512—Air Release, Air/Vacuum, and Combination Air Valves for Waterworks Service.
11. AWWA C515—Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service.
12. AWWA C550—Protective Epoxy Interior Coatings for Valves and Hydrants.
13. AWWA C606—Grooved and Shouldered Joints.
14. AWWA C800—Underground Service Line Valves and Fittings.

G. Fluid Controls Institute (FCI)

1. FCI 70-2—Control Valve Seat Leakage.

H. Manufacturers Standardization Society (MSS)

1. MSS SP-61—Pressure Testing of Steel Valves.
2. MSS SP-67—Butterfly Valves.
3. MSS SP-68—High Pressure Butterfly Valves with Offset Design.
4. MSS SP-81—Stainless-Steel, Bonnetless, Flanged Knife Gate Valves.
5. MSS SP-83—Class 3000 Steel Pipe Unions Socket Welding and Threaded.
6. MSS SP-108—Resilient-Seated Cast-Iron-Eccentric Plug Valves.

I. NACE International (NACE)

1. NACE MR-01—Materials Resistant to Sulfide Stress Cracking in Corrosive Petroleum Refining Environments.

1.06 QUALITY ASSURANCE (NOT USED)

1.07 WARRANTIES

A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, for storing and protecting the items specified in this Section.

B. All valves, unless otherwise directed, shall be loaded and unloaded by lifting, and under no circumstances shall valves be dropped, skidded, or rolled. Valves shall not be stacked or placed under pipe, fittings, or other valves in such a manner that damage could result.

C. Slings, hooks, or tongs used for lifting shall be padded in such a manner as to prevent damage to exterior surface or interior linings and valve components. If any part of the coating, lining, or components is damaged, the repairs or replacement shall be made by the Contractor at his expense and in a manner satisfactory to the Engineer before attempting to install such valves.

D. Only new valves will be allowed for installation and shall be stored in a manner to prevent damage and be kept free of dirt, mud, or other debris.

1.09 QUALIFICATIONS

A. All of the valves shall be products of well-established firms that are fully experienced, reputable, have been selling this product for a minimum of 10 years, and are qualified in the manufacture of the particular product furnished. The valves shall be designed, constructed, and installed in accordance with the requirements and procedures of applicable AWWA standards and shall comply with these Specifications as applicable.

1.10 TESTING REQUIREMENTS (NOT USED)

1.11 MAINTENANCE (NOT USED)

1.12 OPERATIONS AND MAINTENANCE (O&M) MANUALS (NOT USED)

1.13 VALVE TYPE CLASSIFICATIONS

A. Plug Valves (Type 900 Series):

1. Type 902: Eccentric Plug Valves, 4 Inches through 12 Inches.

PART 2 PRODUCTS

2.01 GENERAL

A. Valves are identified in the Drawings by size and type number. For example, a callout of 36V300 refers to a 36-inch-diameter Type 300 valve. A Type 300 valve is a flanged, rubber-seated butterfly valve that is 4 inches through 72 inches for exposed service.

B. All valves shall be complete with all necessary geared actuators, chainwheels and chains, handwheels, levers, valve bonnets, valve boxes, extension stems, operating nuts, and T-handle wrenches, which are required for proper valve operating and completing of the work included under this Section. Renewable parts including discs, packing, and seats shall be of types specified in this Section and acceptable by valve manufacturer for the intended service. All units shall have the name of the manufacturer and the size of the valve cast on the body or bonnet or shown on a permanently attached stainless-steel plate in raised embossed letters. All isolation valves shall be suitable for the intended service with bubble-tight shutoff to flow in either direction.

C. Valves and valve operators shall be factory prepared and primed and field finish coated in accordance with Section 09900, Painting and Coating.

2.02 VALVE ACTUATORS

A. The valve actuator shall be an integral part of a valve. The valve actuator shall be provided, installed, and adjusted by the valve manufacturer. Actuator mounting arrangements shall facilitate operation and maintenance and shall be determined by the valve manufacturer unless indicated otherwise on the Drawings or directed by the Engineer.

B. All valves shall open counter clockwise as viewed from the top. Unless otherwise required by the Owner, the direction of rotation of the wheel or wrench nut to open each valve shall be to the left (counterclockwise). Each valve body or actuator shall have the word "Open" cast on it and an arrow indicating the direction to open.

C. Actuators shall clearly indicate valve position and an adjustable stop shall be provided to set closing torque. All exposed nuts, bolts, and washers shall be AISI Type 316 stainless steel. Unless noted otherwise, valves shall be equipped with the following manual actuators:

1. Buried or Submerged Valves 8 Inches and Larger: Geared actuators with 2-inch-square operating nuts (with valve bonnets, valve boxes, and extension stems as required) and wrench.

D. Gear actuators for valves 8 inches through 20 inches shall be of the worm-and-gear or of the traveling-nut type.

1. Gear actuators should be designed assuming that the differential pressure across the valves is equal to the test pressure of the connecting piping and assuming a line fluid temperature range of 33°F to 125°F, unless otherwise required in the detailed valve specifications.
2. Gear actuators shall be enclosed and oil lubricated with seals provided on shafts to prevent entry of dirt and water into the actuator. Gear actuators for valves aboveground or in vaults and structures shall have handwheels. The actuators for valves in exposed service shall contain a dial indicating the position of the valve disc or plug.
3. Traveling nut and worm-and-gear actuators shall be of the totally enclosed design and proportioned to permit operation of the valve under full differential pressure rating of the valve with a maximum pull of 80 pounds on the handwheel or crank. Stop-limiting devices shall be provided in the actuators in the open and closed positions. Actuators shall be of the self-locking type to prevent the disc or plug from creeping. Design actuator components between the input and the stop-limiting devices to withstand without damage a pull of 200 pounds for handwheel or chainwheel

actuators and an input torque of 300 foot-pounds for operating nuts when operating against the stops.

4. The self-locking worm gear shall be a one-piece design of gear bronze material (ASTM B427; or ASTM B584, Alloy C86200) that is accurately machine cut. Actuators for eccentric and lubricated plug valves may use ductile-iron gears provided the gearing is totally enclosed with spring-loaded rubber lip seals on the shafts. The worm shall be hardened alloy steel (ASTM A322, Grade G41500 or G41400; or ASTM A148, Grade 105-85) with thread ground and polished. Support worm-gear shafts at each end by ball or tapered roller bearings. The reduction gearing shall run in a proper lubricant. The handwheel diameter shall be no more than twice the radius of the gear sector in contact with the worm. Worm-gear actuators shall be Limitorque Model HBC, EIM Series W, or equal.

E. For buried or submerged service, provide watertight shaft seals and watertight valve and actuator cover gaskets. Provide totally enclosed actuators designed for buried or submerged service.

F. All buried valves shall have non-rising stems. All buried valves 3 feet below grade or deeper as measured at the valve centerline shall be furnished with an operator stem extension to extend the operating nut within 6 inches from the top of the valve box cover.

2.03 VALVE END CONNECTIONS

A. Provide valve end connections conforming to connected piping and as shown in the Drawings. Generally, all buried valves shall be mechanical joint type end connectors. Exposed valves shall be screwed-end, socket-weld end, or flanged to conform to adjacent exposed connected piping system.

B. Comply with the following standards:

1. Mechanical (gland) Type: AWWA C111.

C. Nuts, Bolts, and Washers: Wetted or internal to be bronze or stainless-steel. Exposed to be zinc or cadmium-plated.

D. Epoxy Interior Coating: Provide epoxy coating for all interiors of ferrous valve body surfaces in accordance with AWWA C550. Coatings shall be NSF-approved for valves in all potable water piping services. Coatings shall not be required for stainless-steel valve interiors.

2.04 VALVE BOXES

A. All buried valves 2-inch size and larger shall be equipped with a standard cast-iron roadway valve box. Valve boxes shall be of the slip or sliding type with a round lid marked “Sewer” for wastewater. The box shall be designed to prevent transfer of the surface loads directly to the valve or piping. Valve boxes must have a minimum adjustable range of 12 inches and a minimum inner diameter of 6 inches. All valve boxes and lids shall be produced from grey cast-iron conforming to the latest revision of specification for grey iron castings, ASTM designation A48, Class 20A-25A. All castings shall be true and free of holes and shall be cleaned according to good foundry practice, chipped and ground as needed to remove fins and rough places on castings. Valve boxes have to be rated to sustain FDOT H-20 loadings and have a minimum depth of 8 inches. The valve box lid shall fit flush in the top of the box without forcing and shall not rock, tip, or rattle.

B. Provide debris cap as required in the Drawings.

C. Coat buried cast-iron pieces as specified in Section 09900, Painting and Coating, System No. 21 or with fusion-bonded epoxy.

D. Valve boxes shall be as manufactured by Tyler Pipe, Geneco, Star Pipe Products, or equal.

2.05 EXTENSION STEMS

A. Where the depth of the valve is such that its centerline is more than 4 feet below grade, provide operating extension stems to bring the operating nut to a point 6 inches below the surface of the ground and/or box cover. Extension stems shall be Type 316 stainless steel, solid core, and shall be complete with 2-inch-square operating nut. The connections of the extension stems to the operating nuts and to the valves shall withstand without damage a pull of 300 foot-pounds.

B. Extension stem diameters shall be as tabulated below:

Valve Size (inches)	Minimum Extension Stem Diameter (inches)
10, 12	1-1/4

2.06 FLOOR STANDS (NOT USED)

2.07 BOLTS, NUTS, AND GASKETS FOR FLANGED VALVES

A. Bolts, nuts, and gaskets for flanged valves shall be as described in Section 15055, Piping Systems—General.

2.08 PAINTING AND COATING

A. Coat buried metal valves at the place of manufacture as specified in Section 09900, Painting and Coating, System No. 21.

B. Line the interior metal parts of metal valves 4 inches and larger, excluding seating areas and bronze and stainless-steel pieces, with fusion bonded epoxy in accordance with AWWA C550. Apply lining at the place of manufacture.

C. Test the valve interior linings and exterior coatings at the factory with a low-voltage (22.5 to 80 volts, with approximately 80,000-ohm resistance) holiday detector, using a sponge saturated with a 0.5% sodium chloride solution. The lining shall be holiday free.

D. Measure the thickness of the valve interior linings as specified in Section 09900, Painting and Coating. Repair areas having insufficient film thickness as specified in Section 09900, Painting and Coating.

2.09 PLUG (TYPE 900 SERIES)

A. Plug and Seating Design for Eccentric Plug Valves (Series 900): Eccentric plug valves shall comply with MSS SP-108 and the following. Provide a rectangular or circular plug design, with an associated rectangular or round seat. Provide bidirectional seating design. The valve shall seat with the rated pressure upstream and downstream of the closed plug. Provide geared actuators sized for bidirectional operation.

B. For Series 900 eccentric plug valves, the metallic portion of the plug shall be one-piece design and shall be without external reinforcing ribs which result in a space between the rib and the main body of the plug through which water can pass. Valves shall be repackable without any disassembly of valve or actuator. The valve shall be capable of being repacked while under the design pressure in the open position. Nowhere in the valve or actuators shall the valve shaft be exposed to iron-on-iron contact. Sleeve bearings shall be stainless-steel in valve sizes 20 inches and smaller and bronze or stainless-steel in valve sizes 24 inches and larger. Provide enclosed worm-gear actuators for valves 6 inches and larger.

C. Rubber compounds shall have less than 2% volume increase when tested in accordance with ASTM D471 after being immersed in distilled water at a temperature of 73.4°F ±2°F for 70 hours.

D. Type 902—Eccentric Plug Valves, 4 Inches through 12 Inches:

1. Eccentric plug valves 4 inches through 12 inches shall be non-lubricated type. Minimum pressure rating shall be 175 psi. Bodies shall be cast-iron in accordance with ASTM A126, Class B. Ends shall be flanged, Class 125 in accordance with ANSI B16.1 or mechanical joint conforming to AWWA C111 to match connecting piping as shown on the Drawings. Plugs shall be stainless-steel, cast-iron (ASTM A126, Class B), or ductile-iron (ASTM A536, Grade 65-45-12) with Buna-N or neoprene facing. Valve body seats shall be Type 316 stainless-steel or have a raised welded-in overlay at least 1/8-inch thick of not less than 90% nickel. Body capscrews and bolts and nuts shall be Type 316 stainless-steel. Packing shall be butadiene-filled Teflon. Valves shall be DeZurik PET.

PART 3 EXECUTION

3.01 JOINTS

A. Bolt holes of flanged valves shall straddle the horizontal and vertical centerlines of the pipe run to which the valves are attached. Clean flanges by wire brushing before installing flanged valves. Clean flange bolts and nuts by wire brushing, lubricate threads with oil and graphite, and tighten nuts uniformly and progressively. If flanges leak under pressure testing, loosen or remove the nuts and bolts, reseat or replace the gasket, reinstall or retighten the bolts and nuts, and retest the joints. Joints shall be watertight.

B. Clean threaded joints by wire brushing or swabbing. Apply Teflon joint compound or Teflon tape to pipe threads before installing threaded valves. Joints shall be watertight.

C. Install lug-type valves with separate hex head machine bolts at each bolt hole and each flange (two bolts per valve bolt hole).

3.02 INSTALLING BURIED VALVES

A. Connect the valve, coat the joints, apply tape wrapping or polyethylene encasement as required on the Drawings, and place and compact the backfill to the height of the valve stem.

B. Place block pads under the extension pipe to maintain the valve box vertical during backfilling and repaving and to prevent the extension pipe from contacting the valve bonnet.

C. Mount the upper slip pipe of the extension in midposition and secure with backfill around the extension pipe. Pour the concrete ring allowing a depression so the valve box cap will be flush with the pavement surface.

3.03 INSTALLING EXTENSION STEM GUIDE BRACKETS

A. Install extension stem guide brackets at 6- to 8-foot centers. Provide at least two support brackets for stems longer than 10 feet, with one support near the bottom of the stem and one near the top.

3.04 FIELD COATING BURIED VALVES

A. Coat flanges of buried valves and the flanges of the adjacent piping and the bolts and nuts of flanges and mechanical joints, as specified in Section 09900, Painting and Coating, System No. 24.

B. Wrap buried metal valves 6 inches and larger with polyethylene sheet as specified in Section 15155, Ductile Iron Pipe and Fittings.

3.05 VALVE LEAKAGE AND FIELD TESTING

A. Test valves for leakage at the same time that the connecting pipelines are tested. See Section 15144, Pressure Testing of Piping, for pressure testing requirements. Protect or isolate any parts of valves, actuators, or control and instrumentation systems whose pressure rating is less than the pressure test. Valves shall show zero leakage. Repair or replace any leaking valves and retest.

B. Operate manual valves through three full cycles of opening and closing. Valves shall operate from full open to full close without sticking or binding. Do not backfill buried valves until after verifying that valves operate from full open to full closed. If valves stick or bind or do not operate from full open to full closed, repair or replace the valve and repeat the tests.

C. Test gear actuators through three full cycles from full-open to full-close without binding or sticking. The pull required to operate handwheel- or chainwheel-operated valves shall not exceed 80 pounds. The torque required to operate valves having 2-inch AWWA nuts shall not exceed 150 foot-pounds. If actuators stick or bind or if pulling forces and torques exceed the values stated previously, repair or replace the actuators and repeat the tests. Operators shall be lubricated in accordance with the manufacturer’s recommendations before operating.

D. Field testing must be witnessed by the Owner's representative.

END OF SECTION

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SECTION 15144
PRESSURE TESTING OF PIPING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section specifies the hydrostatic and leakage testing of pressure piping for force mains.

1.02 RELATED WORK

A. Section 01500, Temporary Facilities and Controls.

1.03 SUBMITTALS

The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance:

A. Test bulkhead locations and design calculations, pipe attachment details, and methods to prevent excessive pipe wall stresses.

B. Six copies of the test records to the Engineer upon completion of the testing.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to in this Section shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

A. American Water Works Association (AWWA)

1. AWWA C600—Standard for Installation of Ductile Iron Water Mains.
2. AWWA C605—Standard for Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water.

1.06 QUALITY ASSURANCE (NOT USED)

1.07 WARRANTIES

A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, for storing and protecting the items specified in this Section.

1.09 QUALIFICATIONS (NOT USED)

1.10 TEST PRESSURES

A. Test pressures for the various services and types of piping are shown in the Pipe Schedule in the Drawings.

1.11 TESTING RECORDS

A. The Contractor shall provide records of each piping installation during the testing. These records shall include the following information:

1. Date and times of test.
2. Identification of process, pipeline, or pipeline section tested or retested.
3. Identification of pipeline material.
4. Identification of pipe specification.
5. Test fluid.
6. Test duration.

B. Test pressure at low point in process, pipeline, or pipeline section.

C. Remarks: Leaks identified (type and location), types of repairs, or corrections made.

D. Certification by the Contractor that the leakage rate measured conformed to the Specifications.

1.12 MAINTENANCE (NOT USED)

1.13 OPERATIONS AND MAINTENANCE (O&M) MANUALS (NOT USED)

PART 2 PRODUCTS

2.01 TESTING FLUID

A. The Owner will provide a source of supply water for the Contractor's use in filling the lines. An air break shall be maintained at all times between the Owner's distribution system and the Contractor's equipment to prevent cross-connection. The line shall be slowly filled with water and the specified test pressure shall be maintained in the pipe for the entire test period by means of a pump furnished by the Contractor. Provide accurate means for measuring the quantity of water required to maintain this pressure. The amount of water required is a measure of the leakage.

B. Submit request for use of water from the Owner 48 hours in advance.

C. The Contractor shall provide back flow prevention control for temporary connections to existing potable water mains, if used.

2.02 TESTING EQUIPMENT

A. The Contractor shall provide calibrated pressure gauges, pipes, bulkheads, pumps, compressors, chart recorder, and meters to perform the hydrostatic testing. The Contractor shall provide any necessary assistance required for testing.

PART 3 EXECUTION

3.01 TESTING PREPARATION

A. Pipes shall be in place, backfilled, and anchored before beginning pressure testing.

B. The Contractor shall conduct pressure tests on exposed and aboveground piping after the piping has been installed and attached to the pipe supports, hangers, anchors, expansion joints, valves, and meters.

C. For buried piping, the pipe may be partially backfilled and the joints left exposed for inspection during an initial leakage test. However, perform the final pressure test after completely backfilling and compacting the trench.

D. Provide any temporary piping needed to carry the test fluid to the piping that is to be tested. After the test has been completed and demonstrated to comply with the Specifications, disconnect and remove temporary piping. Do not remove exposed vent and drain valves at the high and low points in the tested piping; remove any

temporary buried valves and cap the associated outlets. Plug taps or connections to the existing piping from which the test fluid was obtained.

E. Provide temporary drain lines needed to carry testing fluid away from the pipe being tested. Remove such temporary drain lines after completing the pressure testing.

F. Before starting the test, the Contractor shall notify the Engineer and the Owner's Representative in writing 48 hours prior. The Owner, Engineer, or a representative shall be present during the testing.

3.02 CLEANING

A. Before conducting hydrostatic tests, the Contractor shall flush pipes with water to remove dirt and debris. For pneumatic tests, blow air through the pipes. Maintain a flushing velocity of at least 3 fps for water testing and at least 2,000 fpm for pneumatic testing. Flush pipes for the period given by the formula:

$$T = \frac{2L}{3}$$

in which:

T = flushing time (seconds).
L = pipe length (feet).

3.03 LENGTH OF TEST SECTION FOR BURIED PIPING

A. The maximum length of test section for buried pipe of 12 inches or smaller in diameter is 3,500 feet.

3.04 INITIAL PIPELINE FILLING FOR HYDROSTATIC TESTING

A. The maximum rate of filling shall not cause the water velocity in the pipeline to exceed 1 fps. Filling may be facilitated by removing automatic air valves and releasing air manually.

3.05 TESTING NEW PIPE WHICH CONNECTS TO EXISTING PIPE

A. Before testing new pipelines that are to be connected to existing pipelines, the Contractor shall isolate the new line from the existing line by test bulkheads, spectacle flanges, or blind flanges. After the new line has been successfully tested, remove test bulkheads or flanges and connect to the existing piping.

3.06 HYDROSTATIC TESTING OF ABOVEGROUND OR EXPOSED PIPING

A. Open vents at high points of the piping system to purge air while the pipe is being filled with water. Venting during system filling may also be provided by temporarily loosening flanges.

B. Subject the piping system to the test pressure indicated on the Piping Schedule in the Drawings. Maintain the test pressure for a minimum of 2 hours. Examine joints, fittings, valves, and connections for leaks. The piping system shall show zero leakage or weeping. Correct leaks and retest until zero leakage is obtained.

3.07 HYDROSTATIC TESTING OF BURIED PIPING

A. Where any section of the piping contains concrete thrust blocks or encasement, the Contractor shall not make the pressure test until at least 10 days after the concrete has been placed. When testing mortar-lined or PVC piping, fill the pipe to be tested with water and allow it to soak for at least 24 hours to absorb water before conducting the pressure test.

B. Apply and maintain the test pressure by a positive displacement hydraulic force pump.

C. Maintain the test pressure for 2 hours by restoring the pressure whenever it falls 5 psi.

D. After the test pressure is reached, use a meter to measure the additional water added to maintain the pressure. This amount of water is the loss due to leakage in the piping system. The allowable leakage volume is defined by the formula:

Ductile Iron Pipe:

$$L = \frac{SD(P)^{1/2}}{C}$$

in which:

L = allowable leakage (gallons).
S = length of pipe tested (feet).
D = diameter of the pipe (inches).
P = specified test pressure (psig).
C = 133,200.

E. The leakage test shall be a separate test following the pressure test and shall not be less than 2 hours long. All leaks evident at the surface shall be repaired and leakage eliminated regardless of the total leakage as shown by test. Lines that fail to meet tests shall be repaired and retested as necessary until test requirements are complied with. Defective materials, pipes, valves, and accessories shall be removed and replaced.

F. The allowable leakage for buried piping having threaded, brazed, or welded (including solvent welded) joints shall be zero.

G. Submit plan for testing to the Engineer for review at least 10 days before starting the test.

H. Repair and retest any pipes showing leakage rates greater than that allowed in the criteria above.

3.08 REPETITION OF TEST

A. If the actual leakage exceeds the allowable leakage, locate and correct the faulty work and repeat the test. Restore the work and all damage resulting from the leak and its repair. Eliminate visible leakage.

3.09 BULKHEAD AND TEST FACILITY REMOVAL

A. After a satisfactory test, the Contractor shall remove the testing fluid, remove test bulkheads and other test facilities, and restore the pipe coatings/linings.

END OF SECTION

SECTION 15155
DUCTILE IRON PIPE AND FITTINGS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall provide all materials and incidentals, including piping, fittings, flanged joints, mechanical joints, retainer glands, polyethylene bagging for buried ductile iron piping, fittings, valves, and appurtenances for the ductile iron piping systems required for the work shown on the Drawings and in the Pipe Schedule.

1.02 RELATED WORK

A. Section 01330, Submittals and Acceptance.
B. Section 01650, Delivery, Storage, and Handling.
C. Section 02305, Earthwork for Utilities.
D. Section 09900, Painting and Coating.
E. Section 15055, Piping Systems—General.
F. Section 15144, Pressure Testing of Piping.

1.03 SUBMITTALS

The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance:

A. All ductile iron pipe and fittings to be installed under this Contract shall be inspected and tested at the foundry where the material for this project is manufactured. The Contractor shall submit sworn certificates of such tests and their results.

B. Shop Drawings, including layout drawings, shall be submitted as specified in Section 15055, Piping Systems—General.

C. The Contractor shall submit the pipe manufacturer's certification of compliance with the applicable sections of the Specifications.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to in this Section shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

A. American National Standard Institute (ANSI)

1. ANSI A21.11—Rubber Gasket Joints Cast & Ductile Iron Pressure Pipe.
2. ANSI A21.53—Ductile-Iron Compact Fittings, 3-Inch through 24-Inch (76mm through 610mm) and 54-Inch through 64-Inch (1,400mm through 1,600mm), for Water Service.
3. ANSI B1.1—Unified Inch Screw Threads (UN & UNR Thread Form).
4. ANSI B16.1—Cast Iron Pipe Flanges and Pipe Fittings.
5. ANSI B16.21—Nonmetallic Flat Gaskets for Pipe Flanges.

B. American Society for Testing and Materials (ASTM)

1. ASTM A193—Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
2. ASTM A194—Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service, or Both.
3. ASTM A307—Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
4. ASTM A536—Standard Specification for Ductile Iron Castings.
5. ASTM A563—Standard Specification for Carbons and Alloy Steel Nuts.
6. ASTM B117—Standard Practice for Operating Salt Spray (Fog) Apparatus.
7. ASTM C150—Standard Specification for Portland Cement.
8. ASTM C283—Standard Test Methods for Resistance of Porcelain Enameled Utensils to Boiling Acid.
9. ASTM D714—Standard Test Method for Evaluating Degree of Blistering of Paints.
10. ASTM D792—Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
11. ASTM D1238—Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer.
12. ASTM E96—Standard Test Methods for Water Vapor Transmission of Materials.
13. ASTM G95—Standard Test Method for Cathodic Disbondment Test of Pipeline Coatings (Attached Cell Method).

C. American Water Works Association (AWWA)

1. AWWA C104—Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
2. AWWA C110—Ductile-Iron and Gray-Iron Fittings, 3-Inch through 48-Inch (75mm through 1200mm) for Water and Other Liquids.
3. AWWA C111—Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
4. AWWA C115—Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.
5. AWWA C150—Thickness Design of Ductile-Iron Pipe.
6. AWWA C151—Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids.
7. AWWA C153—Ductile-Iron Compact Fittings, 3-Inch through 16-Inch (76mm through 610mm), for Water and Other Liquids.
8. AWWA C207—Steel Pipe Flanges for Waterworks Service Sizes 4-Inch through 144-Inch (100mm through 3,600mm).
9. AWWA C600—Installation of Ductile-Iron Water Mains and their Appurtenances.
10. AWWA C651—Disinfecting Water Mains.

D. International Organization for Standardization (ISO)

1. ISO-9001—Quality Systems – Model for Quality Assurance in Production, Installation, and Servicing.

1.06 QUALITY ASSURANCE

A. Source Quality Control

1. The ductile iron pipe manufacturer shall submit certification that the pipe and fitting products meet all tests required by AWWA C151.
2. All materials shall be new and have a manufacturer's certificate verifying compliance to all tests and inspections as required in this Section. The weight, class, and casting period shall be shown on each piece of pipe. The manufacturer's “mark,” the year produced, and the word “Ductile” or the letters “DI” shall be cast or stamped on all pipe.

1.07 WARRANTIES

A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, for storing and protecting the items specified in this Section.

1.09 QUALIFICATIONS (NOT USED)

1.10 TESTING REQUIREMENTS

A. See Section 15144, Pressure Testing of Piping, for testing requirements.

1.11 MAINTENANCE (NOT USED)

1.12 OPERATIONS AND MAINTENANCE (O&M) MANUALS (NOT USED)

PART 2 PRODUCTS

2.01 GENERAL

A. All ductile iron piping shall be designed and manufactured in accordance with AWWA C150 and AWWA C151 for the following minimum operating conditions:

1. The minimum internal design pressure shall be 150 psi with a 100-psi surge allowance, with a safety factor of 2, for a total internal design pressure of 500 psi.

2. The external loads design criteria shall be for the minimum cover indicated on the Drawings at 120 lb per cubic feet soil weight and live load based on one AASHTO H-20 truck load. The thickness design of ductile iron pipe shall be in accordance with AWWA C150.

3. The horizontal deflection of cement-mortar-lined ductile iron pipe resulting from external load conditions shall not exceed 3% of the pipe diameter based on the trench design shown on the Drawings.

4. Pressure Class: All ductile iron piping shall meet the following minimum working pressure classes:

a. 4 inches through 12 inches: 350 psi.

2.02 JOINTS

A. Ductile iron fittings shall be furnished with push-on joint, mechanical joints, and flanged joint ends as shown on the Drawings and specified in this Section:

1. Push-On Joints: Push-on joints shall conform to ANSI A21.11/ AWWA C111. Gaskets shall be Viton.
2. Mechanical Joints: All buried ductile iron fittings shall be furnished with mechanical joint ends unless noted otherwise. Mechanical joints shall conform to ANSI A21.11/AWWA C111. Glands shall be constructed of ductile iron.
3. Flanged Joints: Pipe for threaded flange fabrication shall be Special Thickness Class 53 in accordance with AWWA C110, AWWA C111, and AWWA C115. Bolt circle and bolt holes shall match those of ANSI B16.1 Class 125 flanges. The flanges shall be rated for a maximum working pressure of 250 psi. Threaded flanges shall be individually fitted and machine tightened on the pipe ends. Flange facing shall be smooth or with shallow serrations in accordance with AWWA C115.

2.03 FITTINGS

A. General: Ductile iron pipe fittings shall be the compact type meeting the requirements of ANSI/AWWA C110 and C153 where applicable. Fittings shall be manufactured in accordance with ANSI/AWWA C110. Where taps are shown on fittings, tapping bosses shall be provided. At a minimum, fittings shall have the same pressure rating as the connecting pipe.

1. Flanged Joint: ANSI/AWWA C110/21.10 and ANSI B16.1, faced and drilled 125-pound ANSI standard.

2. Mechanical Joint: ANSI/AWWA C110/A21.10

   a. Provide mechanical joint fittings for all buried fittings as shown in the Drawings, unless noted otherwise.
   b. Provide specified gaskets.

2.04 LINING AND COATING

A. Ceramic Epoxy Lined Pipe and Fittings: The Contractor shall notify the Engineer immediately before cutting epoxy-lined ductile iron pipe in the field. The

Contractor shall repair the cut end in accordance with the pipe manufacturer's written procedures.

1. General: The lining shall be an amine-cured novalac epoxy containing at least 20% by volume of ceramic quartz pigment. The lining material shall be Protecto 401 Ceramic Epoxy as manufactured by Induron Protective Coatings, Inc or Vulcan Painters. The lining shall be applied by a competent pipe lining specialty firm with a successful history of applying linings to the interior of ductile iron pipe and fittings.

2. Lining Materials: Lining material shall meet the following requirements and properties:

   a. A permeability rating of 0.00 when tested according to Method A of ASTM E96, Procedure A with a test duration of 30 days.

   b. The following test shall be run on coupons from lined ductile pipe:

Test Parameter	ASTM Test Method	Typical Value
Salt Spray	B117	0.0 undercutting after 2 years
Cathodic disbondment 1.5 volts @ 77º F	G95	No more than 0.5 mm undercutting after 30 days
Immersion	D714	No effect after 2 years for 20% sulfuric acid, 140ºF 25% sodium hydroxide, 160ºF distilled water
Immersion	D714	0.0 undercutting after 2 years for 120ºF tap water

3. Application: The lining applicator shall apply lining according to the requirements of the Protecto 401 Specification and application methods and procedures.

2.05 MANUFACTURERS

A. Acceptable ductile iron pipe manufacturers include US Pipe, American Ductile Pipe, or Griffin Pipe.

2.06 BOLTS

A. General: The Contractor shall provide carbon steel, ASTM A307, Grade A hex head bolts and ASTM A563, Grade A hex head nuts. Threads shall be as specified

in ANSI B1.1 coarse thread series, Class 2A external and Class 2B internal. Nuts, bolts, and gaskets for flanged fittings and blind flanges shall be designed to withstand the design and test pressure ratings for the pipe.

B. Bolts shall be 316 stainless steel.

2.07 GASKETS

A. Gaskets for mechanical joints shall be compatible with sewage pipe service. See Section 15055, Piping Systems—General, for gasket requirements.

B. Gaskets for flanged joints shall be 1/8-inch-thick, cloth-inserted rubber conforming to applicable parts of ANSI B16.21 and AWWA C207. Gasket material shall be free from corrosive alkali or acid ingredients and suitable for use in sewage and reclaimed water lines. Gaskets shall be full-face type for 125-pound flanges.

2.08 RETAINER GLANDS

A. Retainer glands shall be provided for all buried ductile-iron mechanical joints, fitting, and ductile-iron pipe connections to buried valves. Retainer glands shall be designed for joint retaining through the use of a follower gland and set screw-anchoring devices that impart multiple wedging action against the pipe. The mechanical joint-restraint device shall be UL listed and shall have a working pressure of at least 250 psi with a minimum safety factor of 2.

1. Gland: Manufactured of ductile iron conforming to ASTM A536. Gland dimensions shall match ANSI A21.11 and A21.53.

2. Restraining Devices: Manufactured of ductile iron heat treated to a minimum hardness of 370 BHN. Restraining devices shall incorporate a set screw/twist-off nut bolt to ensure the proper actuating of the restraining device. The twist-off nut shall be designed to come off at the torque limit desired to anchor the restraining device in place on the pipe.

3. Joint Deflection: Retainer gland joint deflection shall be limited to manufacturer's recommended maximum deflection angle. Joint deflection shall be applied before the set screws are torqued.

4. Acceptable Manufacturers:

   a. EBAA Iron, Inc. – Megalug 1100 Series.
   b. Ford Uniflange Series UFR 1400.
   c. Tyler Union Tuf Flange.

2.09 EXTERNAL PIPE RESTRAINTS

A. Ductile iron pipe push-on (bell and spigot) joint restraint shall be provided by a restraining harness consisting of a restraint ring, connecting tie-rods, and split-ring assembly installed at all push-on joints. The restraint ring shall consist of wedging components made from 60-42-12 ductile iron conforming to ASTM A536 and wedges heat treated to minimum 370 BHN. Torque limiting twist-off nuts shall be provided on each wedge to ensure proper applied installation torque. The split ring shall be made from 60-42-12 ductile iron conforming to ASTM A536. The connecting rods shall be made of steel conforming to ANSI A12.11/ AWWA C111. Sizes 4- to 16-inch-diameter restraining harnesses shall have 350-psi maximum working pressure rating and 18- to 36-inch-diameter restraining harnesses shall have 250-psi maximum working pressure rating. All harnesses shall be designed with a 2-to-1 safety factor applied to the maximum working pressure rating.

B. Acceptable Manufacturers:

1. EBAA Iron, Inc. – Series 1700.
2. Ford Uniflange Series 1390C.

2.10 INTERNAL PIPE RESTRAINT

A. Acceptable Manufacturers:

1. American Ductile Iron Pipe:

   a. Fast Grip® Gasket.
   b. Flex Ring® Joint.

2. US Pipe:

   a. Field Lok® Gasket.
   b. TR Flex Restrained Joint Pipe and Fittings.

2.11 POLYETHYLENE BAGGING

A. All buried ductile iron pipe, fittings, and valves shall be encased in polyethylene. Polyethylene bagging for buried ductile iron pipe, fittings, and valves shall be 8 mils thickness minimum polyethylene, manufactured in accordance with ASTM D1238, Type I, Class C, Grade E1.

2.12 COLOR CODING OR MARKING

A. Color coding shall be in accordance with Section 15055, Piping Systems—General.

PART 3 EXECUTION

3.01 HANDLING PIPE AND FITTINGS

A. Care shall be taken in loading, transporting, and unloading to prevent injury to the pipe, fitting, lining, and coating. Pipe and fittings shall not be dropped. All pipe and fittings shall be examined before installation, and no piece that the Engineer finds defective shall be installed. The Contractor shall repair any damage to the pipe and fittings coating and/or lining as directed by the Engineer. If the Engineer determines that the coating and/or lining cannot be repaired, the Contractor shall replace the damaged pipe and fittings at no additional compensation.

B. All pipe and fittings shall be subjected to a careful inspection immediately before installation.

C. If any defective pipe is discovered after it has been installed, the Contractor shall remove and replace it with a pipe in satisfactory condition at no additional expense to the Owner.

D. Ceramic epoxy and glass-lined pipe and fittings shall be handled only from the outside of the pipe and fittings. No forks, chains, straps, hooks, etc. shall be placed inside the pipe and fittings for lifting, positioning, or laying.

3.02 PIPE INSTALLATION

A. The Contractor shall provide and use proper implements, tools, and facilities for the safe and convenient performance of the work. All pipe, fittings, valves, and appurtenances shall be lowered carefully into the trench and at above-grade locations to prevent damage to the pipe, protective coating, lining, and polyethylene bagging. Under no circumstances shall pipeline materials be dropped off or dumped. A trench shall be dewatered before the pipe is installed.

B. The Contractor shall carefully examine all pipe fittings, valves, and other appurtenances for damage and other defects immediately before installation and before bagging buried ductile-iron pipe. The Contractor shall mark and hold defective materials for inspection by the Engineer, who may prescribe corrective repairs or reject the materials.

C. The Contractor shall remove all lumps, blisters, and excess coating from the socket and plain ends of push-on joint pipe for buried service. The outside of the plain end and the inside of the bell shall be wiped clean and dry and be free from dirt, sand, grit, or any foreign material before the pipe is laid in trench.

D. The Contractor shall prevent foreign material from entering the pipe while the pipe is being placed in the trench. During installation, no debris, tools, clothing, or other materials shall be placed in the pipe.

E. As each length of buried pipe is placed in the trench, the joint shall be assembled and the pipe brought to correct line and grade. The pipe shall be secured in place with approved backfill material.

F. When pipe is not being laid, the open ends of pipe shall be closed by a watertight plug or other means approved by the Engineer. When practical, the plug shall remain in place until the trench is pumped completely dry. Care shall be taken to prevent pipe flotation should the trench fill with water.

G. Trench width at the top of pipe, bedding conditions, and backfill placement and compaction shall be such that design loadings on the pipe will not be exceeded.

H. Joint Assembly: Pipe joints shall be assembled in accordance with the manufacturer's instructions and the requirements of ANSI/AWWA C600.

1. Flanged Joint: Before connecting flanged pipe the Contractor shall thoroughly clean all faces of the flanges of all oil, grease, and foreign material. The rubber gaskets shall be checked for proper fit and thoroughly cleaned. Care shall be taken to ensure proper sealing of the flange gasket. Bolts shall be tightened so that the pressure on the gasket is uniform. Torque-limiting wrenches shall be used to ensure uniform bearing insofar as possible. If joints leak when the hydrostatic test is applied, the gaskets shall be removed and reset and bolts retightened.
2. Push-On, Restrained Joint, or Mechanical Joint: The Contractor shall joint piping in accordance with the manufacturer's recommendations. Provide all special tools and devices, such as special jacks, chokers, and similar items required for proper installation. Lubricant for the pipe gaskets shall be furnished by the pipe manufacturer, and no substitutes will be permitted under any circumstance.

I. Pipe Deflection: When it is necessary to deflect pipe from a straight line in either the vertical or horizontal plane or where long radius curves are permitted, the amount of deflection shall not exceed that shown in ANSI/AWWA C600 and that recommended by the retainer gland manufacturer for mechanical joint pipe and fittings.

J. Pipe Cutting: For inserting valves, fittings, or closure pieces pipe shall be cut in a neat, workmanlike manner without damaging the pipe or lining. Ductile cast iron may be cut using an abrasive pipe saw, rotary wheel cutter, guillotine pipe saw, milling wheel saw, or oxyacetylene torch. Cut ends and rough edges shall be ground smooth, and for push-on joint connections the cut end shall be beveled.

3.03 ABOVE-GROUND PIPE INSTALLATION

A. The Contractor shall install pipe in horizontal or vertical planes, parallel or perpendicular to building surfaces unless otherwise shown. Support pipe and fittings to prevent strain on joints, valves, and equipment. Install flanged joints so that contact faces bear uniformly on the gasket. Tighten bolts in accordance with the pipe manufacturer's recommendations.

3.04 SURFACE PREPARATION AND PAINTING

A. All exposed pipe and fittings shall be painted as specified in Section 09900, Painting and Coating.

B. All buried steel bolts, nuts, washers, rods, harnesses, clamps, sleeves, and appurtenances shall be painted with System No. 21 as specified in Section 09900, Painting and Coating.

3.05 INSPECTION, TESTING, AND DISINFECTION

A. See Section 15055, Piping Systems—General, and Section 15144, Pressure Testing of Piping.

END OF SECTION

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"City on the Gulf"

CITY OF VENICE, FLORIDA

Purchasing Department

401 W. Venice Avenue
Venice, FL 34285

Invitation to Bid

ITB Number 3083-18

Date of Issue: March 10, 2018

Submission Deadline: April 10, 2018 at 2:00 PM

Title and Purpose of ITB:

EWRF Lift Station Force Main Relocation and Reaeration Blower Replacement Projects

Volume 3

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CITY OF VENICE
EWRF REAERATION BLOWER REPLACEMENT

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SECTION 01010

SUMMARY OF WORK

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Work to be performed under this Contract shall consist of furnishing plant, tools, equipment, materials, supplies, and manufactured articles, and furnishing all labor, transportation, and services, including fuel, power, water, and essential communications, and performing all Work or other operations required for the fulfillment of the Contract in strict accordance with the Contract Documents. The Work shall be complete, and all Work, materials, and services not expressly indicated or called for in the Contract Documents, which may be necessary for the complete and proper construction of the Work in good faith, shall be provided by the Contractor as though originally so indicated, at no increase in cost to the Owner.

B. The term "Owner" shall be defined as the City of Venice, its agents and authorized representatives. The term "Engineer" shall be defined as the Engineer-of –Record for this project which is Hazen and Sawyer, P.C. The site where the work is to take place is the City of Venice's Eastside Water Reclamation Facility, herein referred to as the EWRF.

C. The Contractor shall be responsible for and perform all Work, whether by self-performance or by subcontract to qualified entities, as required for such construction in accordance with the Contract Documents and subject to the terms and conditions of the Contract, complete and ready for use. Wherever the Contract Documents reference a third party, i.e., subcontractor, manufacturer, etc., it is to be considered as falling under the Contractor's overall responsibility even when provided through a third party.

D. The principal features of the Work to be performed under this Contract include replacement of the EWRF Reaeration Blowers and Piping Improvements, including but not limited to, the following:

1. Demolition and removal of existing centrifugal blowers, above grade piping, fittings, valves, and pipe supports.

2. Install two new positive displacement blowers of similar capacity, within sound enclosures.

3. Provide a temporary blower system to maintain reaeration system operation during construction

4. Install new above grade piping, including valves, fittings, and supports.

5. Grout fill or remove existing pipes extending from the blower header to tie-in point, as shown in the contract drawings.

6. Sitework associated with the above work, including grading, paving, and sodding.

7. Yard piping improvements associated with the above work and connect to the existing reaeration air piping.

8. Electrical and Instrumentation system improvements associated with the above work.

E. The foregoing description(s) shall not be construed as a complete description of all Work required.

1.02 CONTRACT DOCUMENTS

A. The term “Contract Documents” refers to the entire set of Bid Proposal, Agreement, General Conditions, Supplementary Conditions, Technical Specifications and Drawings issued at the time of the bid along with any modifications of the bid documents by way of official addendum issued prior to bid opening.

B. The Drawings included in the Contract Documents are entitled “City of Venice Eastside Water Reclamation Facility Reaeration Blower Replacement”. The numbers and titles of all Drawings appear on the drawing index located on Sheet G01. All drawings so enumerated shall be considered an integral part of the Contract Documents as defined herein. Supplemental drawings developed during construction as may be required to be submitted by the Contractor per the specifications shall also be considered a part of the Contract Documents, along with all supplemental drawings issued as part of the response to requests for information (RFIs) during construction or as approved by change order during construction.

C. The Specifications included in the Contract Documents are entitle “City of Venice Water Reclamation Facility Reaeration Blower Replacement” and are as listed in the table of contents included in the specifications. Certain specifications sections or drawings refer to “Divisions” of these specifications. Sections are each individually numbered portions of the Specifications (numerically) such as 08110, 13182, 15206, etc. The term Division is used as a convenience term meaning all Sections within a numerical grouping. For example, Division 16 would thus include Sections 16000 through 16999 and would mean all electrical specifications.

D. Contractor shall perform the work in accordance with the Contract Documents, and in accordance with applicable local and national building codes. Where there is an apparent discrepancy between the Drawings, Specifications, or any local and/or national codes, the more stringent of the requirements shall apply unless otherwise approved by the Engineer.

1.03 GENERAL ARRANGEMENT

A. Drawings indicate the extent and general arrangement of the Work. If any departures from the Drawings are deemed necessary by the Contractor to accommodate the materials and equipment he proposes to furnish, details of such departures and reasons therefore shall be submitted as soon as practicable to the Owner for approval. No such departures shall be made without the prior written approval of the Owner. Approved changes shall be made without additional cost to the Owner for this Work or related Work under other Contracts of the Project.

B. The specific equipment proposed for use by the Contractor on the project may require changes in structures, auxiliary equipment, piping, electrical, mechanical, controls or other Work to provide a complete satisfactory operating installation. The Contractor shall submit to the Owner, for approval, all necessary drawings and details showing such changes to verify conformance with the overall project requirements and overall project operating performance. All costs in connection with the preparation of supplemental drawings and details and all changes to construction Work to accommodate the proposed equipment, including increases in the costs of other Contracts, shall be borne by the Contractor.

1.04 CONSTRUCTION PERMITS, EASEMENTS AND ENCROACHMENTS

A. The Contractor shall obtain, keep current and pay all fees for any necessary construction permits from those authorities, agencies, or municipalities having jurisdiction over land areas, utilities, or structures which are located within the Contract limits and which will be occupied, encountered, used, or temporarily interrupted by the Contractor's operations unless otherwise stated. Record copies of all permits shall be furnished to the Owner.

B. When construction permits are accompanied by regulations or requirements issued by a particular authority, agency or municipality, it shall be the Contractor's responsibility to familiarize himself and comply with such regulations or requirements as they apply to his operations on this Project.

C. Owner building permits shall be obtained by the Contractor. The Contractor shall pull, pay for, obtain, and comply with all required trade permits based on the Conformed Documents provided to the Contractor. Payment for the Owner building permits will be reimbursed to the Contractor through the Permit Allowance included in the bid. Copies of invoices for permit payment shall be submitted with the pay application to be considered for reimbursement.

D. The Contractor shall provide any required Performance and Indemnity Bond(s).

1.05 ADDITIONAL ENGINEERING SERVICES

A. In the event that the Engineer is required to provide additional engineering services as a result of substitution of materials or equipment which are not "or equal" by the Contractor, or changes by the Contractor in dimension, weight, power requirements, etc., of the equipment and accessories furnished, or if the Engineer is required to examine and evaluate any changes proposed by the Contractor for the convenience of the Contractor, then the Engineer's charges in connection with such additional services shall be charged to the Contractor by the Owner.

B. Structural design shown on the Contract Drawings is based upon typical weights for major items of equipment as indicated on the Contract Drawings and specified. If the equipment furnished differs from that specified in the Contract Documents such that actual weight exceeds the weight of specified equipment, the Contractor shall assume the responsibility for all costs of redesign and for any construction changes required to accommodate the equipment furnished, including the Engineer's expenses in connection therewith, provided that the original weight assumptions were correct.

C. In the event that the Engineer is required to provide additional engineering services as a result of Contractor's errors, omissions, or failure to conform to the requirements of the Contract Documents, or if the Engineer is required to examine and evaluate any changes proposed by the Contractor solely for the convenience of the Contractor, then the Engineer's charges in connection with such additional services shall be charged to the Contractor by the Owner.

1.06 ADDITIONAL OWNER'S EXPENSES

A. In the event the Work of this Contract is not completed within the time set forth in the Contract or within the time to which such completion may have been extended in accordance with the Contract Documents, the additional engineering or inspection charges incurred by the Owner may be charged to the Contractor and deducted from the monies due him. Extra Work or supplemental Contract Work added to the original Contract, as well as extenuating circumstances beyond the control of the Contractor, will be given due consideration by the Owner before assessing engineering and inspection charges against the Contractor.

B. Unless otherwise specifically approved, the normal time of Work under this Contract is limited to nine (9) hours per day, Monday through Friday, excluding Owner holidays, generally between the hours of 7:00 a.m. and 4:00 p.m. unless otherwise approved by the Owner. Work beyond these hours, beyond otherwise approved hours, or on weekends or holidays, will result in additional expense to the Owner. Any expenses and/or damages, including the cost of the Engineer's on site personnel, arising from the Contractor's operations beyond the hours and days specified above shall be borne by the Contractor.

C. Charges assessed to the Contractor for additional engineering and inspection costs will be determined based on actual hours charged to the job by the Engineer. Daily rates will depend on the number and classifications of employees involved, but in no case shall such charges exceed $250 per day for Owner inspectors based on an eight hour work day and up to $450 per day for engineer time based on 2 hours per day.

D. Charges for additional Owner's expenses shall be independent of any liquidated damages assessed in accordance with the Contract.

E. Schedule and perform the Work in such a manner as to result in the least possible disruption to the Owner’s ability to meet permit conditions for the EWRF. If it becomes imperative to perform Work at night for critical shutdowns that must be done under periods of low flow, the Owner shall be informed in writing a minimum of 72 hours in advance of the beginning of such Work and the Contractor must receive written approval from the Owner for performing such work after hours. Temporary lighting and all other necessary facilities for performing and inspecting the Work shall be provided and maintained by the Contractor.

1.07 LABOR EMPLOYED

A. All labor employed by the Contractor and subcontractors for the Work shall abide by all applicable Owner labor laws for non-discrimination. The Contractor further understands and agrees that it is the Contractor’s responsibility to assure that all laborers are legal US citizens or legally registered aliens of the US.

1.08 SANITARY PROVISIONS

A. Provide and maintain, in a neat and sanitary condition, such accommodations for the use of the Contractor's employees as are necessary to comply with the requirements and regulations of the State and Federal Government, committing no public nuisance. The Contractor understands and agrees that the Owner's existing facilities are not to be used by construction personnel.

1.09 CONTRACTOR'S RESPONSIBILITY FOR WORK

A. Until acceptance of the Work by the Owner, it shall be under the charge and custody of the Contractor who shall take every necessary precaution against injury or damage to the Work by the action of the elements or from any other cause whatsoever, arising either from the execution or from the non-execution of the Work. The Contractor shall protect, rebuild, repair, restore and make good, without additional compensation, all injury or damage to any portion of the Work occasioned by any cause before its completion and acceptance.

1.10 MAINTENANCE OF ACCESS AND SITE TRAFFIC

A. Provide all measures to ensure continuous, safe access for the Owner's operations and maintenance staff in the performance of their duties. Submit maintenance of personnel and vehicular access and traffic patterns when it is necessary to close normal paths of access or traffic within the plant site. Contractor's actions shall make no disruption of public roadway traffic at any time.

1.11 TEMPORARY ENVIRONMENTAL CONTROLS

A. Noise Control: Eliminate noise within the project area to the extent possible. "Residential" type mufflers shall be installed on all gasoline and diesel engines. All local ordinances and regulations covering noise control shall be observed.

B. Air Pollution ("Dust") Control: Control dust emissions at all times through appropriate construction techniques, containment of dust to confined areas of the work, and by regular wetting of unpaved temporary construction access ways during dry weather.

C. Vibration Control: Vibration Control shall be in accordance with Federal, State, and local regulations. It is the Contractor's sole responsibility to prevent damage from vibration to adjacent structures and property.

D. Solid and Hazardous Waste

1. Solid wastes may be disposed of in a number of ways, including reuse on the project, sale for fuel, through controlled incineration, donation to other public private dump sites, either free or for a fee. The method of disposal is restricted according to the classification of the waste material by the CFR 40 - 190 to 399, and by local requirements. Hazardous material shall be disposed of in Class I or Class II-1 waste disposal facilities.

2. Haul routes for transporting solid or hazardous wastes are subject to the approval of the Owner.

1.12 STORAGE

A. Storage conditions shall be acceptable to Owner for all materials and equipment not immediately incorporated into the Work but included in Applications for Payment. Such storage arrangements and conditions shall be presented in writing for Owner's review and approval and shall afford adequate and satisfactory security and protection. Off-site storage facilities shall be accessible for inspection. The stored materials shall be insured for full value. Certificates of liability insurance coverage must be submitted to the Owner with the request for payment. All arrangements and costs for storage facilities shall be paid by the Contractor.

B. The Contractor may utilize the staging area shown on the Drawings within the limits of the site for location of office facilities, storage of materials and equipment, and as a staging area. The staging area shall be finished graded, seeded, and a healthy stand of grass established upon completion of the Work at no additional cost to the Owner.

1.13 FIRE PROTECTION

A. Contractor shall take all necessary precautions to prevent fires at or adjacent to the Work, buildings, etc., and shall provide adequate facilities for extinguishing fires which do occur. Open fires shall not be permitted.

B. When fire or explosion hazards are created in the vicinity of the Work as a result of the locations of fuel tanks, or similar hazardous utilities or devices, the Contractor shall immediately alert the local Fire Marshal and the Owner of such tank or device. The Contractor shall exercise all safety precautions and shall comply with all instructions issued by the Fire Marshal and shall cooperate with the Owner of the tank or device to prevent the occurrence of fire or explosion.

1.14 CHEMICALS

A. All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, or reactant of other classification, must show approval of either the EPA or USDA. Use of all such chemicals and disposal of residues shall be in strict conformance with all applicable rules and regulations.

1.15 FIRST AID FACILITIES AND ACCIDENTS

A. First Aid Facilities: The Contractor shall provide at the site such equipment and facilities as are necessary to supply first aid to any of his personnel who may be injured in connection with the Work.

B. Accidents

1. The Contractor shall promptly report, in writing, to the Owner all accidents whatsoever out of, or in connection with, the performance of the Work, whether on

or adjacent to the site, which cause death, personal injury or property damage, giving full details and statements of witnesses.

2. If death, serious injuries, or serious damages are caused, the accident shall be reported immediately by telephone to both the Owner and Engineer.

3. If any claim is made by anyone against the Contractor or a Subcontractor on account of any accidents, the Contractor shall promptly report the facts, in writing, to the Owner, giving full details of the claim.

1.16 DISPOSITION OF CLAIMS RELATED TO OTHER CONTRACTORS

A. During the progress of the Work, other contractors may be engaged in performing other work or may be awarded other contracts for additional work on this project. In that event, the Contractor shall coordinate the Work to be done hereunder with the work of such other contractors and the Contractor shall fully cooperate with such other contractors and carefully fit its own Work to that provided under other contracts as may be directed by the Owner. The Contractor shall not commit or permit any act which will interfere with the performance of work by any other contractor.

B. If the Owner shall determine that the Contractor is failing to coordinate his Work with the work of other contractors as the Owner directed, then the Owner shall have the right to withhold any payments otherwise due hereunder until the Contractor completely complies with the Owner's directions.

C. If the Contractor notifies the Owner in writing that another contractor is failing to coordinate his work with the Work of this Contract as directed, the Owner will promptly investigate the charge. If the Owner finds it to be true, the Owner will promptly issue such directions to the other contractor with respect thereto as the situation may require and issue a response to the Contractor in writing. The Owner, nor any of the Owner’s agents, shall not be liable for any damages suffered by the Contractor by reason of the other contractor's failure to promptly comply with the directions so issued by the Owner, or by reason of another contractor's default in performance, it being understood that the Owner does not guarantee the responsibility or continued efficiency of any contractor.

D. The Contractor shall indemnify and hold the Owner harmless from any and all claims of judgments for damages and from costs and expenses to which the Owner may be subjected or which it may suffer or incur by reason of the Contractor's failure to comply with the Owner's directions promptly.

E. Should the Contractor sustain any damage through any act or omission of any other contractor having a contract with the Owner for the performance of work upon the site or of work which may be necessary to be performed for the proper execution of the Work to be performed hereunder, or through any act or omission of a subcontractor of such Contract, the Contractor shall have no claim against the Owner for such damage, but shall have a right to recover such damage from the other contractor through other outside legal pursuits.

F. Should any other contractor having or who shall hereafter have a Contract with the Owner for the performance of work upon the site sustain any damage through any act or omission of the Contractor hereunder or through any act or omission of any subcontractor of the

Contractor, the Contractor agrees to reimburse such other contractor for all such damages and to defend at his own expense any suit based upon such claim and if any judgment or claims against the Owner shall be allowed, the Contractor shall pay or satisfy such judgment or claim and pay all costs and expenses in connection therewith and shall indemnify and hold the Owner harmless from all such claims.

G. The Owner's right to indemnification hereunder shall in no way be diminished, waived or discharged, by its recourse to assessment of liquidated damages as provided in the Contract, or by the exercise of any other remedy provided for by Contract Documents or by law.

1.17 LIMITS OF WORK AREA

A. The Contractor shall confine his construction operations within the Contract limits shown on the Drawings and/or property lines and/or fence lines. Storage of equipment and materials, or erection and use of sheds outside of the Contract limits, if such areas are the property of the Owner, shall be used only with the Owner's approval. Such storage or temporary structures, even within the Contract's limits, shall be confined to the Owner's property and shall not be placed on properties designated as easements or rights-of-way unless specifically permitted elsewhere in the Contract Documents.

1.18 WEATHER CONDITIONS

A. No Work shall be done when the weather is unsuitable. The Contractor shall take necessary precautions (in the event of impending severe weather, including hurricanes, tropical storms or major rain/wind storms) to protect all Work, materials, or equipment from damage or deterioration due to floods, driving rain, and/or wind. In the event of an extreme tropical weather event (tropical storm or greater), the Contractor shall submit a tropical storm/hurricane plan to the Owner and Engineer for approval. The Owner reserves the right to order that additional protection measures over and beyond those proposed by the Contractor, be taken to safeguard all components of the Project.

B. The mixing and placing of concrete or pavement courses, the laying of masonry, and installation of sewers and water mains shall be stopped during rainstorms, and all freshly placed Work shall be protected by canvas or other suitable covering in such manner as to prevent running water from coming in contact with it. Sufficient coverings shall be provided and kept ready at hand for this purpose. The limitations and requirements for mixing and placing concrete, or laying of masonry, in cold weather shall be as described elsewhere in these Specifications.

1.19 PERIODIC CLEANUP: BASIC SITE RESTORATION

A. During construction, the Contractor shall regularly remove from the site of the Work all accumulated debris and surplus materials of any kind which result from his operations. Unused equipment and tools shall be stored at the Contractor's yard or base of operations for the Project.

B. When the Work involves installation of sewers, drains, water mains, manholes, underground structures, or other disturbance of existing features in or across access roads and paths, driveways, public streets, rights-of-way, easements, or private property, the

Contractor shall (as the Work progresses) promptly backfill, compact, grade, and otherwise restore the disturbed area to the basic condition which will permit resumption of pedestrian or vehicular traffic and any other critical activity or functions consistent with the original use of the land. The requirements for temporary paving of streets, walks, and driveways are specified elsewhere. Unsightly mounds of earth, large stones, boulders, and debris shall be removed so that the site presents a neat appearance.

C. The Contractor shall perform the cleanup Work on a regular basis and as frequently as ordered by the Owner. Basic site restoration in a particular area shall be accomplished immediately following the installation or completion of the required facilities in that area. Furthermore, such Work shall also be accomplished, when ordered by the Owner, if partially completed facilities must remain incomplete for some time period due to unforeseen circumstances.

D. Upon failure of the Contractor to perform periodic cleanup and basic restoration of the site to the Owner's satisfaction, the Owner may, upon five days prior written notice to the Contractor, without prejudice to any other rights or remedies of the Owner, cause such Work for which the Contractor is responsible to be accomplished to the extent deemed necessary by the Owner, and all costs resulting therefrom shall be charged to the Contractor and deducted from the amounts of money that may be due him.

1.20 USE OF FACILITIES BEFORE COMPLETION

A. The Owner reserves the right to enter and use any portion of the constructed facilities before final completion of the whole Work to be done under this Contract. However, only those portions of the facilities which have been completed to the Owner's satisfaction, as evidenced by his issuing a Certificate of Substantial Completion to the Contractor covering that part of the Work, shall be placed in service.

B. It shall be the Contractor's responsibility to prevent premature connections to or use of any portion of the installed facilities before the Owner issues a Certificate of Substantial Completion covering that portion of the Work to be placed in service.

C. Consistent with the approved progress schedule, the Contractor shall cooperate with the Owner to accelerate completion of those facilities, or portions thereof, which have been designated for early use by the Owner.

1.21 WORK PLANNING FOR CRITICAL FUNCTIONS

A. When the work involves requests for after-hours work, interruption of operations of any kind, demolition of any kind, tie-ins to existing processes and piping, and/or training events, written notice shall be given to the Owner in the form of a detailed work plan a minimum of 3 calendar days prior to the early start date for the work being considered.

B. In as much as possible, such critical work functions shall be identified and brought up a the progress meeting preceding the need for such work.

C. The Owner will have final approval on the details, timing, and scheduling of all such work to best avoid any potential for non-compliance of permit conditions and to assure adequate Owner personnel are available as needed.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION –

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Payment for the various items in the Schedule of Payment items, as further specified herein, shall include all compensation to be received by the Contractor for furnishing all tools, equipment, supplies, and manufactured articles, and for all labor, operations, taxes, materials, commissions, transportation and handling, bonds, permit fees, insurance, overhead and profit, and incidentals appurtenant to the items of Work being described, as necessary to complete the various items of the Work all in accordance with the requirements of the Contract Documents, including all appurtenances thereto, and including all costs of compliance with the regulations of public agencies having jurisdiction, including Safety and Health Requirements of the Occupational Safety and Health Administration of the U.S. Department of Labor (OSHA). Such compensation shall also include payment for any loss or damages arising directly or indirectly from the Work.

B. The Contractor's attention is called to the fact that the quotations for the various items of Work are intended to establish a total price for completing the Work in its entirety. Should the Contractor feel that the cost for any item of Work has not been established by the Schedule of Payment items or this Section, it shall include the cost for that Work in some other applicable bid item and identified, so that its proposal for the project does reflect its total price for completing the Work in its entirety.

C. The following explanation of measurement and payment for the bid form items is made for information and guidance. The omission of reference to any item in this description shall not, however, alter the intent of the bid form or relieve the Contractor of the necessity of furnishing such as part of the contract at no additional cost.

1.02 PAYMENT ITEMS FOR BID

A. Items are as enumerated on the Bid Form:

1. Mobilization

a. The Contractor shall provide a breakdown of the lump sum bid for mobilization. The breakdown shall identify items of preparatory work and operations with the corresponding cost per item.

b. Payment for mobilization, Bid Item No. 1, will be payable based the schedule of payment below:

1) 1st Pay Application: 25% of lump sum bid price

2) 2nd Pay Application: 25% of lump sum bid price

3) 3rd pay application: 25% of lump sum bid price

4) 4th pay application: 25% of lump sum bid price

c. Payment for the contract lump sum price for mobilization, which price and payment shall include, but not be limited to, 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, and for the establishment of safety equipment and first aid supplies, sanitary and other facilities, as required by these Contract Documents, and State and local laws and regulations; and any other preconstruction expense necessary for the start of the Work; including the cost of field engineering, coordination with existing utilities, location of existing utilities and potential conflicts, permits and fees, construction schedules, preconstruction video and photographs, project signs, shop drawings, temporary facilities, lay down storage area, construction aids, work associated with Contractor support during Owner/Engineer testing, reviews and inspection, re-inspection and any rework resulting from same, and cleaning.

2. Demobilization

a. The demobilization item shall be a minimum of 25% of the total mobilization and demobilization line items, payable in the final project close-out payment.

b. Payment for demobilization, Bid Item No. 2, will be made at the Contract lump sum price for the item, which price and payment shall include, but not be limited to, preparatory work and operations in demobilizing for the end of the Work on the project including, but not limited to, those operations necessary for the movement of personnel, equipment, supplies and incidentals from the project site, and for removal of any temporary facilities, as required by these Contract Documents, and State and local laws and regulations; and any other post-construction expense necessary for the end of the Work; including the cost of field engineering, final photographs, removal of project signs, close out documents, clean up of lay down storage area, clean up of site, project records documents, operating and maintenance data.

3. Site Work and Erosion Control

a. Measurement of various items for Site Work and Erosion Control will not be made for payment, and all items shall be included in the lump sum price.

b. Payment for Site work and Erosion Control will be made at the Contract lump sum price for the item, which price and payment shall include, but not be limited to, full compensation for furnishing and installation of erosion control systems, silt fences, inlet protection, geotextile fabric, turbidity barriers, and maintenance of any necessary erosion and water pollution control facilities as required in the Contract Documents. Work shall also include sidewalk demolition and replacement, road demolition and replacement, site restoration, which can include seeding, sodding, and other necessary efforts to return the existing site to the conditions prior to work being performed.

Payment will be based on percentage of work completed during the pay period at time of pay application. The cumulative total shall not exceed the lump sum bid pay item amount.

4. Blower Replacement

    a. Measurement for various items for the Blower Replacement will not be made for payment, and all items shall be included in the lump sum price.

    b. Payment for the Blower Replacement item, will be made at the Contract lump sum price for the item, which price shall be full compensation for all labor, materials, and equipment as required in the Contract Documents. This bid item includes, but is not limited to, furnishing and installation of two positive displacement blowers with sound enclosures, new reaeration blower control panel with VFDs and PLC, along with associated fittings, piping, instruments, gauges, and valves. The bid item also includes connections, supports, electrical, and controls for a complete and operational positive displacement blower system. Effort will include installation of the new blowers on the existing concrete pads, performance of shop, functional and performance testing, training, and startup of the equipment. Payment will be based on percentage of work completed during the pay period at time of pay application. The cumulative total shall not exceed the lump sum bid pay item amount. NOTE: Fabrication of the control panel as specified under Section 11185 may be added to the scope of work for the Instrumentation Subcontractor at Contractor's discretion but the value for this control panel shall remain under this bid item.

5. Maintenance of Operations/ Temporary Blower System

    a. Measurement for various items for the Maintenance of Operations/Temporary Blower System will not be made for payment, and all items shall be included in the lump sum price.

    b. Payment for the Maintenance of Operations/Temporary Blower System, will be made at the Contract lump sum price for the item, which price shall be full compensation for all labor, materials, and equipment as required in the Contract Documents. This bid item includes, but is not limited to, furnishing and installation of temporary blowers, temporary piping, fittings, connections, and valves. The bid item also includes pipe supports, electrical wiring and conduit, noise attenuators, electrical connections to existing site MCC, system testing and operation, breakdown and removal of all temporary piping, fittings, electrical components, and blower equipment after temporary blower system is no longer needed. The payment shall include all labor, tools, equipment, electrical work, and incidentals necessary to complete the work. This item shall include preliminary engineering, development of temporary blower plan, submittal and plans, and field visits necessary for planning, start-up and training that is required for an operational system.

6. Demolition

    a. Measurement of separate items for Demolition will not be made for payment

and all items shall be included in the lump sum price.

b. Payment for Demolition will be made at the Contract lump sum price for the item, which price and payment shall include, but not be limited to, full compensation for the labor, materials, equipment services required for removal of the items shown on the drawings and generally required for completion of the work in accordance with the Contract Documents. This item includes, but is not limited to, removal of the two existing centrifugal blowers, existing reaeration blower control panel, existing electrical and control wiring between the existing MCC and the existing reaeration blower control panel, above grade and below grade reaeration air piping, fittings, pipe supports, and valves, grout fill of existing below grade reaeration piping to be left in place. This item will include removal of debris from site, site restoration/preparation for installation that will follow, transportation and appropriate disposal of all items not retained by Owner. Payment will be based on percentage of work completed during the pay period at time of pay application. The cumulative total shall not exceed the lump sum bid pay item amount.

7. Blower Piping Improvements

a. Measurement of various items for Blower Piping will not be made for payment, and all items shall be included in the lump sum price.

b. Payment for Blower Piping will be made at the Contract lump sum price for the item, which price shall be full compensation for all labor, materials, tools, and equipment as required in the Contract Documents. This bid item includes, but is not limited to: furnish and installation of all above ground and buried reaeration piping and fittings, valves, pipe supports, painting and coating, and testing as required for complete and operational piping systems. Payment will be based on percentage of work completed during the pay period at time of pay application. The cumulative total shall not exceed the lump sum bid pay item amount.

8. Electrical Systems

a. Measurement for separate items for the Electrical systems will not be made for payment, and all items shall be included in the lump sum price.

b. Payment for the Electrical systems will be made at the Contract lump sum price for the item, which price and payment shall be full compensation for all labor, materials, tools, and equipment as required in the Contract Documents. This bid item includes, but is not limited to: furnish and installation of modifications to existing MCC cubicles, conduits, wiring and cables, and terminations for new connections for power, field instruments and devices, conduit supports, labeling and testing as required for a complete and operational electrical systems. This item also includes installation for power supply to the temporary blowers. Payment will be based on percentage of work completed during the pay period at time of pay application. The cumulative total shall not exceed the lump sum bid pay item amount.

9. Controls and Integration Improvements

   a. Measurement for the separate items for the Controls and Integration Improvements will not be made for payment, and all items shall be included in the lump sum price.

   b. Payment for the Controls and Integration Improvements will be made at the Contract lump sum price for the item, which price and payment shall be full compensation for all labor, materials, tools, and equipment as required in the Contract Documents. This bid item includes, but is not limited to: furnish and installation of field instruments and all programming and startup testing as required for complete integration of the new blower remote monitoring and control from the existing plant HMI as specified herein, integrating signals from new blowers and field instruments and updates to existing HMI screens within SCADA. Payment will be based on percentage of work completed during the pay period at time of pay application. The cumulative total shall not exceed the lump sum bid pay item amount.

1.03 PAYMENT ITEMS FOR CONSTRUCTION PAY APPLICATIONS

A. The Contractor shall submit a Schedule of Payment Values within ten days of execution of contract. The schedule shall be formatted per EJCDC pay application form No. C-620 for the purpose of making progress payments during the construction period.

B. The schedule shall be given in sufficient detail for proper identification of Work accomplished. The Schedule of Payment Values shall complement the items of work detailed in the construction progress schedule and the construction network analysis in order to accurately relate construction progress to the requested payment. Each item shall include its proportional share of all costs including the Contractor's overhead, contingencies and profit. The sum of all scheduled items shall equal the total value of the Contract.

C. If the Contractor bills for stored materials stored on the project site or off-site in bonded warehouse, it shall also submit copies of vendor invoices for each delivered item, and the invoice amounts shall correspond to the “stored” amount requested in the payment application.

PART 2 – PRODUCTS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

- END OF SECTION -

SECTION 01035

MODIFICATION PROCEDURES

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall provide all labor, materials, equipment and appliances required for the complete execution of additions, modifications and alterations to existing buildings and structures as shown on the Drawings and specified under the various Sections of the Contract Specifications and as required by conditions at the site.

B. The Contractor shall have examined all work to be performed to the existing buildings and familiarize himself with the nature and extent to which the existing buildings will be damaged, items removed or rearranged due to the work under his Contract and that of other Contracts.

1. Cutting and patching shall conform to the requirements of the General Conditions, Supplemental Conditions, and as specified herein.

2. Patching work shall be performed with similar materials and in the same manner as adjoining work. Joining between old and new work shall be perfect and practically invisible. All due caution shall be taken to obtain a bond between old and new work.

C. Major portions of the work are indicated on the Drawings and the accompanying Specifications thereto. All work must be complete in all respects and executed with high quality workmanship.

D. Work not specifically indicated by details or general notes on the Drawings may include the following:

1. Removing loose rust, sealing or peeling paint from metal surfaces by scraping, sanding or wire brushing; priming and repainting metal surface (inside and outside) as specified under Division 9 - Finishes.

2. Patching and repairing existing structures.

3. Cutting and modifying existing sidewalk and concrete pads as necessary for new work.

1.02 SITE AND BUILDINGS

A. Site Visit

1. Prior to submission of Bids, the Contractor shall have visited the site and thoroughly acquainted himself with the exact nature of the work indicated on the Drawings and the Specifications requirements. Failure to comply with the

aforementioned requirements shall not constitute a basis for claims for additional compensation.

B. Measurements

1. Prior to ordering any materials or doing any work, the Contractor shall verify all measurements, dimensions and other conditions of each building scheduled for work as may be necessary or required in connection with his work. The Contractor shall be responsible for the correctness of same.

1.03 MATERIALS

A. All materials to perform and complete the work shall be new.

1.04 WORK PREPARATION AND TEMPORARY ACCESS

A. The Contractor, before commencing work, shall prepare and submit for approval a progress schedule in accordance with the requirements of Section 01300 entitled "Submittals", in order to coordinate the work of all trades and to insure completion on or before the completion date. The Owner reserves the right to revise or modify such schedules as required to expedite each phase of work and to coordinate such work with the partial use of the building for purposes as directed.

B. No facility such as toilets, corridors, etc., shall be barricaded or access restricted without providing other temporary or interim means of access. It is further required that no work specified hereinafter shall disturb or interfere with the operation of the existing mechanical installation until proposed new work has been completed or satisfactorily installed. Exception may be made to this requirement only by written approval from the Owner.

C. Detailed sequence of availability of areas where work is to be performed under each Contract shall be in accordance with Section 01520 entitled "Maintenance of Utility Operations During Construction", but may be modified by the Contractor, upon authorization by the Owner as the work progresses.

D. Existing built-in equipment to remain in the final work, but requiring temporary removal for the installation of new construction, alterations, repairs and/or renovations, shall be disconnected by the Contractor and removed to temporary storage areas designated by the Owner. Resetting of existing equipment under this heading shall be performed by the Contractor including connecting to electric service lines.

E. The Contractor shall furnish and install all temporary fire exits, fire extinguishers, hose and safety devices as may be required by authorities having jurisdiction.

F. Work within existing area, once started, shall be completed as quickly as practicable and each trade shall determine before work is started that all required materials are at hand or readily obtainable to avoid delays.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -

SECTION 01040

COORDINATION

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall allow the Owner or their agents to enter upon the work for the purpose of operating, maintaining, removing, repairing, altering, or replacing such pipes, sewers, conduits, manholes, wires, poles, or other structures and appliances which may be required to be installed at or in the work. The Contractor shall cooperate with all aforesaid parties and shall allow reasonable provisions for the prosecution of any other work by the Owner, or others, to be done in connection with normal use of the facilities.

B. The Contractor shall assume full responsibility for the correlation of all parts of the Work with that of other contractors. The Contractor's superintendent shall correlate all work with other contractors in the laying out of work. The Contractor shall lay out the Work in accordance with the Drawings, Specifications, and instructions of latest issue and with due regard to the work of other contractors.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -

SECTION 01070

ABBREVIATIONS AND REFERENCE STANDARDS

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Wherever in these specifications references are made to the standards, specifications, or other published data of the various national, regional, or local organizations, such organizations may be referred to by their acronym or abbreviation only. As a guide to the user of these specifications, the following acronyms or abbreviations which may appear in these specifications shall have the meanings indicated herein.

1.02 ABBREVIATIONS AND ACRONYMS

AASHTO	American Association of the State Highway and Transportation Officials
ACI	American Concrete Institute
ACIFS	American Cast Iron Flange Standards
ACOE	Army Corps of Engineers
AGMA	American Gear Manufacturer's Association
AI	The Asphalt Institute
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute, Inc.
APHA	American Public Health Association
APWA	American Public Works Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
DIPRA	Ductile Iron Pipe Research Association
FBC	Florida Building Code
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FS	Federal Specifications
IEEE	Institute of Electrical and Electronics Engineers
NBS	National Bureau of Standards
NEC	National Electrical Code

NEMA	National Electrical Manufacturer's Association
NFPA	National Fire Protection Association
NSF	National Science Foundation
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association

1.03 REFERENCE STANDARDS

A. Wherever reference is made to any published standards, codes, or standard specifications, it shall mean the latest standard code, specification, or tentative specification of the technical society, organization, or body referred to, which is in effect at the date of invitation for Bids.

B. All materials, products, and procedures used or incorporated in the work shall be in strict conformance with applicable codes, regulations, specifications, and standards.

C. A partial listing of codes, regulations, specifications, and standards includes the following:

American Concrete Institute (ACI)

American Gear Manufacturers Association (AGMA)

American Institute of Steel Construction, Inc. (AISC)

American Iron and Steel Institute (AISI)

American National Standards Institute (ANSI)

American Society of Civil Engineers (ASCE)

American Society of Mechanical Engineers (ASME)

American Society for Testing and Materials (ASTM)

American Water Works Association (AWWA)

Federal Specifications

Florida Building Code

Institute of Electrical and Electronics Engineers (IEEE)

National and Local Fire Codes

National Electrical Code (NEC)

National Electrical Manufacturer's Association (NEMA)

National Electrical Safety Code (NESC)

National Electrical Testing Association (NETA)

National Fire Protection Association (NFiPA)

Regulations and Standards of the Occupational Safety and Health Act (OSHA)

Southern Building Code Congress International, Inc. (SBCCI)

Standard Building Code

Standard Mechanical Code

Standard Plumbing Code

Uniform Building Code (UBC)

D. Contractor shall, when required, furnish evidence satisfactory to the Engineer that materials and methods are in accordance with such standards where so specified.

E. In the event any questions arise as to the application of these standards or codes, copies shall be supplied on-site by the Contractor.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION –

SECTION 01200

PROJECT MEETINGS

PART 1 -- GENERAL

1.01 PRECONSTRUCTION MEETING

A. A preconstruction meeting will be held after Award of Contract, but prior to starting work at the site. The Engineer shall prepare and distribute the meeting agenda and shall preside at the meeting. The Engineer shall record and distribute minutes of the proceedings and decisions.

B. Attendance:

1. Owner
2. Engineer
3. Contractor

C. Minimum Agenda:

1. Proposed construction schedule and proposed schedule of payment values
2. Critical work sequencing
3. Designation of responsible personnel
4. Processing of Field Decisions and Change Orders
5. Adequacy of distribution of Contract Documents
6. Proposed Schedule of Submittals and handling of Shop Drawings and samples
7. Procedures for maintaining project and record documents – required use of project management software such as e-Builder.
8. Use of site and Owner's requirements
9. Major equipment deliveries and priorities
10. Safety and first aid procedures
11. Security procedures
12. Housekeeping procedures
13. Processing of Partial Payment Requests
14. General regard for community relations

1.02 PROGRESS MEETINGS

A. Progress meetings will be held monthly at the Eastside Water Reclamation Facility during the performance of the work of this Contract. Additional meetings may be called as progress of work dictates.

B. Engineer will prepare and distribute agenda, preside at meetings and record minutes of proceedings and decisions; and will distribute copies of minutes to participants.

C. Attendance:

1. Owner

2. Engineer

3. Contractor

4. Subcontractors, as required

D. Minimum Agenda:

1. Review and approve minutes of previous meetings.

2. Updated construction schedule review

3. Review progress of Work since last meeting.

4. Review proposed planned work in next work period.

5. Review of outstanding submittals, RFI's, and possible changes in the work

6. Note and identify problems/needs which may impede planned progress.

7. Develop corrective measures and procedures to regain planned schedule.

8. Review of coordination for other work on site, work quality, adherence to standards, safety issues, and other concerns from Owner.

9. Schedule next progress meeting.

PART 2 – PRODUCTS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

- END OF SECTION -

SECTION 01300

SUBMITTALS

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. This section specifies the means of all submittals. A general summary of the format and types of submittals required is as follows:

Format of Submittal	Type of Submittal
Digital and Hard Copy	Construction Schedule
Digital and Hard Copy	Schedule of Payment Items
Digital	Shop Drawings
Digital and Hard Copy	Warranties
Digital or Hard Copy	Certificates
Digital and Hard Copy	O&M Materials
Digital	Photographs

B. At the preconstruction conference, submit a detailed list of items for which shop drawings, construction drawings, and samples will be submitted. Included in this list shall be the names of all proposed Suppliers furnishing specified items. Review of this list by the Engineer shall not relieve Contractor from submitting complete drawings and data and providing materials, equipment, etc., fully in accordance with the Contract Documents.

C. All submittals shall be submitted in digital, electronic, pdf format, other than samples. When hard copies are required, as noted above, submit the number of copies as noted herein. For all digital submittals, the Contractor shall submit one electronic copy to the Engineer via e-mail. The Engineer will return one electronic file of each submittal with engineer's stamp and response comments to the Contractor and Owner via e-mail. The Contractor shall be responsible to distribute the submittal response as needed to subcontractors impacted by each individual submittal. In the case of samples, an electronic submittal transmittal shall still be made with a description of the sample submitted with all samples delivered to an address approved by the Owner.

1.02 SUBMITTAL PROCEDURES

A. Transmit each submittal with an approved transmittal form, the enclosed material and other pertinent information specified in other parts of this section. Identify any and all variations from Contract Documents and product or system limitations which may be detrimental to successful performance of the completed Work.

B. The transmittal form shall include:

1. The project name and address of project
2. Owner's name and contract number
3. Engineer's name and project number
4. Contractor's name and job number
5. Date of submittal
6. Submittal number *
7. Description of the submittal contents and number of pages included
8. Reference to specification and/or drawing pertinent to the submittal
9. Signature of Contractor's PM indicating that the material has been reviewed by the Contractor
10. A blank space of at least 1/4 of the page for the Engineer's stamp.

* The submittal number shall be in sequential, chronological order (001 through 999) with subsequent resubmittals marked 001A, 001B, etc. for any given submittal item.

C. Submittals will be returned by the Engineer as "Furnish as Submitted" (no changes required), "Furnish as Corrected" (minor corrections as noted to be furnished, no resubmittal required unless specifically noted), or "Revise and Resubmit", revise and resubmit submittal per comments made and identify all changes made on each subsequent resubmittal.

D. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.

1.03 CONSTRUCTION SCHEDULES

A. Within thirty (30) days after issuance of the Notice to Proceed, the Contractor shall prepare and submit his proposed progress schedule electronically in PDF format to the Engineer for review and approval.

B. If so required, the schedule shall be revised until it is approved by the Engineer.

C. Schedule shall be updated monthly, depicting progress to the last day of the month and five (5) copies submitted to the Engineer not later than the fifth day of the month, and prior to the application for progress payment. Failure to provide monthly schedule updates will be grounds for the Engineer or Owner to withhold progress payment approval.

D. Schedule shall be prepared in the form of a horizontal bar chart showing in detail the proposed sequence of the work and identifying construction activities for each structure and for each portion of work. Schedule shall include anticipated delivery and return dates for major project submittals.

E. Schedule shall be time scaled, identifying the first day of each week. The Schedule shall be provided with estimated dates for Early Start, Early Finish, Late Start and Late Finish. The work shall be scheduled to complete the Project within the Contract time. The Late Finish date shall equal the Contract Completion Date.

F. Schedule shall show duration (number of days) and float for each activity. Float shall be defined as the measure of leeway in starting or completing a scheduled activity without adversely affecting the project completion date established by the Contract Documents.

G. Updated schedule shall show all changes since the previous submittal.

H. All revisions to the schedule must have the prior approval of the Engineer.

1.04 SCHEDULE OF PAYMENT VALUES

A. The Contractor shall prepare a Detailed Schedule of Values to correspond with the Original Schedule as required under Section 1.03 in conjunction with the Original Schedule submission.

1. Because the ultimate requirement is to develop a detailed schedule of values sufficient to determine appropriate monthly progress payment amounts through cost loading of the Schedule activities, sufficient detailed breakdown shall be provided to meet this requirement. If, in the opinion of the Owner, a greater number of Schedule of Value items than proposed by the Contractor is necessary the Contractor shall add the additional items so identified by the Owner.

2. A cross-reference list shall be developed in two parts:

a. List each schedule activity with the respective valued items making up the total cost of the activity.

b. List each valued item with the respective schedule activity or activities that make up the total cost indicated. In the case where a number of schedule items make up the total cost for a valued item (shown in the schedule of values) the total cost for each scheduled item should be indicated.

B. The schedule shall be given in sufficient detail for the proper identification of Work accomplished. Each item shall include its proportional share of all costs including the Contractor's overhead, contingencies and profit. The sum of all scheduled items shall equal the total value of the Contract.

C. If the Contractor anticipates the need for payment for materials stored on the project site, the schedule shall include specific submitted, delivered and installed activities for such items.

D. The Contractor shall expand or modify the above schedule and materials listing as required by the Owner's initial or subsequent reviews.

E. The Contractor's schedule of payment items shall be, at a minimum, categorized by the WBS breakdown in the Contractor’s schedule.

1.05 SHOP DRAWINGS

A. The Contractor shall submit for review shop drawings for concrete reinforcement, structural details, piping layout and appurtenances, wiring, color selection charts,

Contractor Furnished Equipment, materials and equipment fabricated especially for this Contract, and materials and equipment for which such Drawings are specified or specifically requested by the Engineer.

B. Shop drawings shall show the principal dimensions, weight, structural and operating features, space required, clearances, type and/or brand of finish or shop coat, grease fittings, installation/erection drawings, etc., depending on the subject of the Drawings.

C. When so specified, or if considered by the Engineer to be acceptable, the manufacturer's specifications, catalog data, descriptive matter, illustrations, etc. may be submitted for review in place of shop drawings. In such case, the requirements shall be as specified for shop drawings, insofar as applicable.

D. The Contractor shall be responsible for the prompt submittal of all shop drawings so that there shall be no delay to the Work due to the absence of such Drawings. The Engineer will review the shop drawings within 14 calendar days of receipt of such Drawings. Reviewed shop drawings will be returned to the Contractor by regular mail, posted no later than 14 days after receipt.

E. Time delays caused by rejection of submittals are not cause for extra charges to the Owner or time extensions.

F. Requirements: All shop drawings shall be submitted to the Engineer through the Contractor. The Contractor is responsible for obtaining shop drawings from his subcontractors and returning reviewed Drawings to them. All Drawings shall be clearly marked with the name of the project, Owner, Contractor, and building, equipment, or structure to which the drawing applies. Drawings shall be suitably numbered and stamped by the Contractor. Each shipment of Drawings shall be accompanied by a letter of transmittal giving a list of the drawing numbers and the names mentioned above.

G. Product Data: Where manufacturer's publications in the form of catalogs, brochures, illustrations, or other data sheets are submitted in lieu of prepared shop drawings, such submission shall specifically indicate the particular item offered. Identification of such items and relative pertinent information shall be made with indelible ink. Submissions showing only general information will not be accepted. Non-applicable information shall be crossed out.

H. Product data shall include materials of construction, dimensions, performance characteristics, capacities, wiring diagrams, piping and controls, etc.

I. Warranties: When warranties are called for, a sample of the warranty shall be submitted with the shop drawings. The sample warranty shall be the same form that will be used for the actual warranty. Actual warranties shall be originals and notarized.

J. Work Prior to Review: No material or equipment shall be purchased, fabricated especially for this Contract, or delivered to the project site until the required shop drawings have been submitted, processed and marked either "FURNISH AS SUBMITTED" or "FURNISH AS CORRECTED". All materials and Work involved in the construction shall be as represented by said Drawings.

K. The Contractor shall not proceed with any portion of the Work (such as the construction of foundations) for which the design and details are dependent upon the design and details of equipment for which submittal review has not been completed, unless mutually agreed to by Contractor and Owner in writing.

L. Contractor's Review: Only submittals which have been checked and corrected should be submitted to the Contractor by its subcontractors and vendors. Prior to submitting shop drawings to the Engineer, the Contractor shall check thoroughly all such Drawings to satisfy itself that the subject matter thereof conforms to the Drawings and Specifications. Drawings which are correct shall be marked with the date, checker's name and indications of the Contractor's approval, and then shall be submitted to the Engineer.

M. Contractor's Responsibility: The Engineers review of shop drawings will be general and shall not relieve the Contractor of the responsibility for details of dimensions, etc., necessary for proper fitting and construction of the Work required by the Contract and for achieving the specified performance.

N. Contractor's Modifications: For submissions containing departures from the Contract Documents, the Contractor shall include proper explanation in his letter of transmittal. Should the Contractor submit for review equipment that requires modifications to the structures, piping, layout, etc. detailed on the Drawings, he shall also submit for review details of the proposed modifications. If such equipment and modifications are accepted, the Contractor, at no additional cost to the Owner, shall do all Work necessary to make such modifications.

O. Complete Submittals: Each submittal shall be complete in all aspects incorporating all information and data required to evaluate the products' compliance with the Contract Documents. Partial or incomplete submissions shall be returned to the Contractor without review.

P. Shop Drawing Distribution: The Contractor shall submit an electronic copy of all shop drawings to the Engineer for review. Where full size drawings are required, the Contractor shall submit one reproducible vellum and two bluelines or blacklines. Shop drawings will be reviewed, stamped and distributed with the appropriate box checked either "FURNISH AS SUBMITTED", "FURNISH AS CORRECTED" or "REVISE AND RESUBMIT". The distribution of processed shop drawings will be as follows:

- 1 electronic copy will be returned to the Contractor
- 1 electronic copy will be sent to the Owner

Q. If the Contractor requires additional copies of returned shop drawings, it shall include extra Drawings in its original submittal. The Engineer will process the Drawings and return them to the Contractor.

1.06 WARRANTIES

A. Warranties called for in the Contract Documents shall be originals and submitted to the Owner. When warranties are required they shall be submitted prior to request for final payment.

B. When advance copies of warranties are requested, they shall be submitted with, and considered as shop drawings.

1.07 CERTIFICATES

A. Four copies of certificates of compliance and test reports shall be submitted for requested items to the Owner prior to request for final payment. Certificates shall be submitted digitally unless otherwise unavailable.

1.08 OPERATION AND MAINTENANCE MANUALS

A. The Contractor shall submit preliminary Operations and Maintenance (O&M) Manuals for review by the Engineer, and final O&M Manuals for each item of equipment at or before the time the equipment is delivered to the project site in accordance with Section 01730 of these specifications.

1.09 CONSTRUCTION PHOTOGRAPHS

A. Construction Photographs Required

1. Photographs shall be taken daily on all major activities of the work prior to beginning the work and after the work is completed. Contractor shall discuss with the Owner what photos are to be taken each day.

2. Views and Quantities Required

a. Two (2) views of each activity, one before and one after completion of work.

b. Provide one electronic digital file copy of each view

c. Submit construction photograph digital files on digital media on a weekly basis on the Monday following the week photos are taken. Update digital file copy set on a daily basis.

B. File name of each digital file shall include the date the photo was taken. Photos shall be in color and have high resolution and sharpness to be useful in future inquiries to the work record.

PART 2 – PRODUCTS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

- END OF SECTION –

SECTION 01385

PRE-CONSTRUCTION VIDEO

PART 1 - GENERAL

1.01 SCOPE

A. Prior to the commencement of any work, including Contractor mobilization, the Contractor shall have a continuous color digital audio-video DVD recording taken of the interior and exterior areas of any areas of the existing wastewater plant site that are likely to be impacted by construction activities. The audio-video record is to serve as a record of preconstruction conditions. The CD/DVD recording shall be suitable for viewing on standard laptop and/or desk top computers used by the Engineer and Owner. Two copies of the CD/DVD recording shall be kept at the temporary construction office, one with the Owner and one with the Contractor until completion of the work at which time at least one copy shall be turned over to the Owner.

1.02 CONSTRUCTION SCHEDULE

A. Digital recordings shall not be made more than 30 days prior to construction in any area. No construction shall begin prior to review and approval of the digital recordings, covering the construction area, by the Engineer and Owner. The Engineer shall have the authority to reject all or any portion of the digital recording not conforming to the specifications and order that it be redone at no additional charge. The Contractor shall reschedule unacceptable coverage within five (5) days after being notified. The Engineer shall designate those areas, if any, to be omitted from or added to the audio-video coverage. All master CD/DVD's and written records shall be well maintained without any damage and shall become the property of the Owner.

1.03 PROFESSIONAL VIDEO-GRAPHERS

A. The Contractor shall engage the services of a professional video-grapher. The color audio-video digital recordings shall be prepared by a responsible commercial firm known to be skilled and regularly engaged in the business of pre-construction color audio-video digital documentation. Additional information to be furnished by the video-grapher shall include the names and addresses of two (2) references that the video-grapher has performed color audio-videotaping for on projects of a similar nature, including one (1) within the last twelve (12) months.

PART 2 - PRODUCT

2.01 GENERAL

A. The total audio-video digital 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, and clear pictures with accurate colors and shall be free from distortion or any other form of picture imperfection. All video recordings shall, by electronic means, display on the screen the day, the time, the month, and the year of the recording. This date and time information must be continuously and simultaneously generated with the actual recording. The audio portion of the recording shall produce the commentary of the camera operator with proper volume, clarity, and be free from distortion.

2.02 EQUIPMENT

A. Audio/Video Recorder: Digital voice and video recorder, MPEG-4 recording technology for TV quality video recording, built-in microphone for high quality voice and sound recording, 3.15 Mega Pixel CDD Sensor with up to 640x480 video resolution, 4X digital zoom, 16MB internal memory, SD/MMC compatible, compatible with software needed and cabling provided to interface with a Windows XP based computer for creating high quality CD/DVD file records.

B. Video CD/DVDs: Used to create and store digital video, audio and multimedia files. Stores up to 4.7GB or more than two hours of MPEG2 Video, compatible for playback with most DVD players and DVD-ROM drives on Windows XP based computers. The DVDs shall be new and shall not have been used for any previous recording.

PART 3 - EXECUTION

3.01 COVERAGE

A. The recordings shall contain coverage of all surface features located within the construction areas and shall include but not be limited to: all roadways, pavements, detention ponds, ditches, walls, piping, equipment, curbs, driveways, sidewalks, culverts, headwalls, retaining walls, buildings, landscaping, trees, shrubbery, fences, and electrical power poles and equipment. Of particular concern shall be the existence of any faults, fractures, or defects.

B. Recording coverage shall be grouped by structure providing both exterior and interior coverage for all areas that will be affected by the work. The outside areas of the work for the general area grounds shall be covered in grid format to cover the property for the construction areas that will be affected by the work. Coverage shall include all surface conditions located within the zone of influence of construction supported by appropriate audio description.

3.02 AUDIO CONTENT

A. Accompanying the video recording shall be a corresponding and simultaneously recorded 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 features being shown in the video portion of the recording including the location relative to construction activities planned. The audio recording shall be free from any conversations between the camera operator and any other production technicians. Panning, zoom-in and zoom-out rates shall be sufficiently controlled to maintain a clear view of all subjects.

3.03 VIDEO CD/DVD LABELING

A. Video CD/DVD Identification: All CD/DVD's for the digital video recordings shall be permanently labeled using commercial CD labeling software and labels. CD/DVD's shall be properly identified by disc number, project title, and date recorded.

B. Video CD/DVD Logs: Each video recording digital file shall have a log of that video recording's contents and what CD/DVD the recording file is stored on. The log shall describe the various segments of coverage contained on that video recording in terms of the location within the plant, extent of coverage, beginning and end points, directions of coverage, and date.

3.04 TIME OF EXECUTION

A. Visibility: All recording 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 for outdoor recordings to properly illuminate the subject, and to produce bright, sharp video recordings of those subjects. For indoor recordings, the Contractor shall provide adequate lighting to produce bright, sharp video recordings. No recording shall be performed when more than 10% of the area to be recorded contains debris or obstructions unless otherwise authorized by the Engineer.

3.05 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 and proceeds uninterrupted to the other end of that area. Coverage shall reflect an organized, interrelated sequence of recordings from one construction area to another. Coverage shall be obtained by walking or by other conveyance approved by the Engineer.

3.06 COVERAGE RATES

A. The rate of travel during a particular segment of coverage shall be related to the amount of the surface features within a construction area being recorded. For interior and exterior of existing structures, average rate of travel shall not exceed thirty feet per minute from approximately 10 feet from subject. For open areas within the existing plant, average rate of travel shall not exceed forty-eight feet per minute. For open areas within the project

area, average rate of travel shall not exceed sixty feet per minute

3.07 CAMERA OPERATION

A. Camera Stability: Camera shall be firmly held such that movement of the camera during the recording process does not cause an unsteady picture.

B. 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 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 picture quality.

C. 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 building distinguishing characteristics shall be incorporated at the beginning of each recording. The narrator shall regularly call out changes in direction, viewing angle, focus zoom, and distinguishing subjects as the video recording progresses.

D. Operator Experience: The operator in charge must have had previous experience with audio-video documenting preconstruction work. Any apprentice operator(s) must be continuously supervised by an experienced operator.

3.08 DVD VIEWING

A. The CD/DVD recordings shall be suitable for playing and video and audible recordings on standard computer desktop or laptop computers as well as conventional DVD players.

- END OF SECTION -

SECTION 01400

QUALITY CONTROL

PART 1 -- GENERAL

1.01 FIELD TESTING OF EQUIPMENT

A. All equipment shall be set, aligned and assembled in conformance with the manufacturer's drawings and instructions.

B. Preliminary Field Tests

1. As soon as conditions permit, after the equipment has been secured in its permanent position, the Contractor shall check the equipment for alignment, direction of rotation and that it is free from defects.

2. Contractor shall flush all bearings, gear housings, etc., in accordance with the manufacturer's recommendations, to remove any foreign matter accumulated during shipment, storage or erection. Lubricants shall be added as required by the manufacturer's instructions.

3. When the Contractor has demonstrated to the Owner that the equipment is ready for operation, the equipment will be marked or tagged accordingly in a manner suitable to the Contractor and the Owner.

4. Preliminary field tests must be completed before equipment is subjected to final field tests.

C. Final Field Tests

1. Upon completion of the installation, and at a time approved by the Owner, equipment will be tested by operating it as a unit with all related piping, ducting, electrical controls and mechanical operations.

2. The equipment will be placed in continuous operation as prescribed or required and witnessed by the Owner.

3. The tests shall prove that the equipment and appurtenances are properly installed, meet their operating cycles and are free from defects such as overheating, overloading, and undue vibration and noise. Equipment shall be tested for the characteristics as specified for the item.

4. Until final field tests are acceptable to the Owner, the Contractor shall make all necessary changes, readjustments and replacements at no additional cost to the Owner.

5. Defects which cannot be corrected by installation adjustments will be sufficient grounds for rejection of any equipment.

6. Upon acceptance of the field tests, equipment will be marked or tagged accordingly in a manner suitable to the Contractor and Owner. The marking or tag shall not be removed and no further construction work will be performed on the unit, except as required during start-up operations and directed by the Owner.

7. Contractor's scope of work with regard to field testing shall include all materials, equipment, instruments, labor, etc.

1.02 DEFECTIVE WORK, EQUIPMENT, OR MATERIALS

A. Any defective work, equipment, or materials furnished by the Contractor which is discovered before the final acceptance of the work, as established by the Certificate of Final Completion, or during the subsequent warranty period, shall be removed immediately even though it may have been overlooked by the Owner and estimated for payment. Any equipment or materials condemned or rejected by the Owner shall be tagged as such and shall be promptly removed from the site. Satisfactory work or materials shall be substituted for that rejected.

B. The Owner may order tests of defective or damaged work, equipment, or materials to determine the required functional capability for possible acceptance, if there is no other reason for rejection. The cost of such tests shall be borne by the Contractor; and the nature, tester, extent and supervision of the tests will be as determined by the Owner. If the results of the tests indicate that the required functional capability of the work, equipment, or material was not impaired, consistent with the final general appearance of same, the work, equipment, or materials may be deemed acceptable. If the results of such tests reveal that the required functional capability of the questionable work, equipment, or materials has been impaired, then such work, equipment, or materials shall be deemed imperfect and shall be replaced. The Contractor may elect to replace the imperfect work, equipment, or material in lieu of performing the tests.

1.03 INSPECTION AND TESTS

A. The Contractor shall allow the Owner ample time and opportunity for testing materials and equipment to be used in the work. He shall advise the Owner promptly upon placing orders for material and equipment so that arrangements may be made, if desired, for inspection before shipment from the place of manufacture. The Contractor shall at all times furnish the Owner and his representatives, facilities including labor, and allow proper time for inspecting and testing materials, equipment, and workmanship. The Contractor must anticipate possible delays that may be caused in the execution of his work due to the necessity of materials and equipment being inspected and accepted for use. The Contractor shall furnish, at his own expense, all samples of materials required by the Owner for testing, and shall make his own arrangements for providing water, electric power, or fuel for the various inspections and tests of structures and equipment.

B. The Contractor shall furnish the services of representatives of the manufacturers of certain equipment, as prescribed in other Sections of the Specifications. The Contractor shall also place his orders for such equipment on the basis that, after the equipment has been tested prior to final acceptance of the work, the manufacturer will furnish the Owner with certified statements that the equipment has been installed properly and is ready to be placed in functional operation. Tests and analyses required of equipment shall be paid

for by the Contractor, unless specified otherwise in the Section which covers a particular piece of equipment.

C. Where other tests or analyses are specifically required in other Sections of these Specifications, the cost thereof shall be borne by the party (Owner or Contractor) so designated in such Sections. The Owner will bear the cost of all tests, inspections, or investigations undertaken by the order of the Owner for the purpose of determining conformance with the Contract Documents if such tests, inspection, or investigations are not specifically required by the Contract Documents, and if conformance is ascertained thereby. Whenever nonconformance is determined by the Owner as a result of such tests, inspections, or investigations, if overtime or standby costs are incurred due to delays in the scheduled work and associated tests, the Contractor shall bear the full cost thereof or shall reimburse the Owner for said cost. In this connection, the cost of any additional tests and investigations, which are ordered by the Owner to ascertain subsequent conformance with the Contract Documents, shall be borne by the Contractor.

1.04 WORK SUPERVISION

A. The Contractor shall at all times, while any work is being performed on the project site, as his agent, a competent superintendent capable of thoroughly interpreting the plans and specifications and thoroughly experienced in the type of work being performed. The superintendent shall have full authority to execute the work as required and to supply promptly any materials, tools, equipment, labor and incidentals which may be required. Such superintendence shall be furnished regardless of the amount of work sublet. For any sublet work, particularly for specialties such as electrical and instrumentation, a similarly competent superintendent shall be on site when any such sublet work is being performed that is not in the Contractor’s superintendent’s field of expertise.

B. The Contractor's superintendent shall speak and understand English, and at least one responsible person who speaks and understands English shall be on the project during all working hours for all subcontractors.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION –

SECTION 01510

TEMPORARY UTILITIES

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall provide temporary telephone, light and power, heating, potable water service and sanitary facilities for their operations. The Contractor shall make arrangements, pay the costs for, and pay for the usage of metered utility connections for electrical and water for use at construction trailers. The Contractor shall pay for and arrange for temporary power for construction purposes around the site, bottled water sources for construction staff, and for portable sanitary facilities for construction labor, including legal disposal of collected waste in such facilities.

B. The Contractor shall coordinate and install all temporary services in accordance with the requirements of the utility companies having jurisdiction and as required by applicable codes and regulations.

C. At the completion of the work, or when the temporary services are no longer required, the facilities shall be restored to their original conditions.

D. All costs in connection with the temporary services including, but not limited to, installation, utility company service charges, maintenance, relocation and removal shall be borne by the Contractor at no additional cost to the Owner.

E. Some temporary facilities that may be required may be indicated on the Drawings; however, the Drawings do not necessarily show any or all of the temporary facilities that the Contractor ultimately uses to complete the work.

F. Temporary Power

1. Provide and pay for all temporary power needs for construction purposes through a metered power source from the local power company. Temporary power shall be obtained through a temporary power feed from the local power company that meets all applicable codes. Distribution of power to multiple use sites shall be through suitable power panels and power cords meeting all applicable codes.

G. Temporary Sanitary Service

1. Sanitary conveniences, in sufficient numbers, for the use of all persons employed on the Work and properly screened from public observation, shall be provided and maintained at suitable locations by the Contractor, all as prescribed by State Labor Regulations and local ordinances. The contents of same shall be removed and disposed of in a manner consistent with local and state regulations, as the occasion requires. The Contractor shall rigorously prohibit the committing of nuisances within, on, or about the Work. Sanitary facilities shall be removed from the site when no longer required.

2. Connection of temporary sanitary waste lines from toilet facilities within construction trailers may be made to the Owner's raw sewage sanitary gravity system if, how, where, and when approved by the Owner.

H. Temporary Water

1. The Contractor shall provide water service for construction purposes, drinking water for construction staff, sanitary facilities, fire protection, field offices and for cleaning. The Contractor shall make all arrangements for potable water through bottled water services or other method without temporarily connecting to the utility's potable water.

2. The Contractor shall pay all charges for potable water used under this Contract.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -

SECTION 01520

MAINTENANCE OF UTILITY OPERATIONS, CONSTRUCTION CONSTRAINTS, AND CONSTRUCTING SEQUENCING

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The existing plant will be maintained in continuous operation by the Owner during the entire construction period of the Contract as herein specified. The intent of this Section is to outline the minimum requirements necessary to provide continuous treatment to meet permit effluent limits for the full range of influent flow to the plant throughout the construction period and to provide continuous, uninterrupted service for potable water, sanitary waste disposal, telephone, internet, power, and remote monitoring and control systems used by plant operations and maintenance staff in the execution of their duties.

B. Work shall be scheduled and conducted by the Contractor so as not to impede any treatment process, reduce the quality of the plant effluent, interrupt any utility service, or cause odor or other nuisance except as explicitly permitted hereinafter. In performing the work shown and specified, the Contractor shall plan and schedule his work to meet the plant and collection system operating requirements, and the constraints and construction requirements as outlined in this Section. No discharge of raw or inadequately treated wastewater shall be allowed. The Contractor shall pay all civil penalties, costs, assessments, etc., associated with any discharge of raw or inadequately treated wastewater associated with the Contractor's work.

C. The Contractor shall be responsible for coordinating the general construction and the schedules of electrical and related trades and for ensuring that permanent or temporary power and controls are available for all existing, proposed, and temporary facilities that are required to be on line at any given time.

D. The Contractor has the option of providing additional temporary facilities that can eliminate a constraint, provided it is done without cost to the Owner and provided that all requirements of these Specifications are fulfilled. Work not specifically covered in the following paragraphs may, in general, be done at any time during the contract period, subject to the operating requirements and constraints and construction requirements outlined hereinafter. All references to days in this Section shall be consecutive calendar days.

1.02 GENERAL CONSTRAINTS AND CONSTRUCTION SEQUENCE

A. The Contractor shall review the Contract Documents and shall be responsible to determine all such connections or modifications, and the scope and cost of all temporary measures required to isolate the work area without the need for a shutdown of the affected facility, process area, piping or utility in as much as possible.

B. Any temporary work, facilities, roads, walks, protection of existing structures, piping, blind flanges, valves, equipment, etc. that may be required within the Contractor's work limits to maintain continuous and dependable plant operation shall be furnished by the Contractor.

C. The Owner shall have the authority to order Work postponed, stopped or prohibited that would, in his opinion, unreasonably result in interrupting the necessary functions of the plant operations. No claim for additional time or compensation shall be made due to such stop work orders.

D. If the Contractor impairs performance or operation of the plant (i.e. flow, water quality, etc.) as a result of not complying with specified provisions for maintaining plant operations, then the Contractor shall immediately make all repairs or replacements and do all work necessary to restore the plant to operation to the satisfaction of the Owner. Such work shall progress continuously to completion on a 24-hours per day, seven days per week basis.

E. The Contractor shall provide the services of emergency repair crews on call as required.

F. Suggested Construction Sequence: The following paragraphs represent a suggested sequence of construction, does not include all items necessary to complete the work, and is intended to identify the sequence of critical events necessary to minimize disruption to the on-going treatment plant process and to ensure compliance with discharge requirements. It shall be understood by the Contractor that the critical events identified are not all inclusive and that additional items of work not shown may be required. The sequence of construction is a precedence requirement and does not attempt to schedule the Contractor's work. It is intended only to indicate which activities must precede other activities in order to minimize interferences and disruptions.

1. Stage 1 – Mobilization, Initial Demolition, and Preliminary Site Work.

    a. Mobilize for work - set up staging area, obtain permits, develop and submit construction schedule, shop drawing schedule and begin shop drawing submittals.

    b. Clear areas, perform soft digs to verify existing piping, utilities, and potential crossings. Install temporary erosion control measures as identified in the contract documents.

    c. Demolition of existing infrastructure necessary to accommodate construction as indicated on contract drawings.

2. Stage 2 – Modification to existing Reaeration Air Piping.

    a. Install proposed reaeration air yard piping without making tie-ins. Will include above ground tee and valves.

    b. Test new reaeration air piping prior to tie-in.

    c. Install temporary blower power feed wiring in existing conduit, do not connect to existing MCC

d. Install the temporary blowers and temporary discharge piping as required by the Contract Documents and Contractor recommendations.

e. Disconnect electrical power feed for existing reaeration blowers and connect temporary blowers for short period to verify electrical connection and ability to operate.

f. Reconnect existing reaeration blowers to electrical power feed.

g. Shutdown of the reaeration system and perform the following steps to connect the temporary reaeration blowers:

1) Removal of the existing reaeration air yard piping

2) Tie-in of the new reaeration air yard piping to the existing buried reaeration air piping near the anoxic tank per the Contract Drawings.

3) Disconnect electrical power at the existing MCC to the existing reaeration blowers and connect the electrical power for the temporary reaeration blowers to the existing MCC

4) Begin operation of temporary reaeration blowers

3. Stage 3 – Installation of New Reaeration Blowers

a. Installation of the new positive displacement blowers including all valves, fittings, supports, electrical and instrumentation components

b. Installation of new above grade reaeration piping header, flow meter, and valves.

c. Disconnect electrical power at the existing MCC to the temporary reaeration blowers and connect the electrical power for the new reaeration blowers to the existing MCC

d. Perform start-up and field testing of the reaeration blower system

e. After start-up and testing acceptance of the new reaeration blowers, the temporary reaeration blower system can be removed

f. Remove and cap and grout existing reaeration air yard piping, as shown on the Contract Documents

g. Perform road repairs

4. Stage 4 – Decommissioning and Demobilization

a. Complete project closeout in accordance with Section 01700, "Project Closeout

b. Final acceptance of the project

G. The existing facilities shall remain in operation during construction for the Owner to meet all permit conditions. Any need to interrupt the ability of the Owner to meet permit conditions as needed to complete construction requirements shall be mitigated by the Contractor's construction sequencing plan to restrict interruptions within the limited time specified during low flow periods. If longer interruptions are needed, the Contractor shall provide temporary means and systems to bypass or otherwise make provisions for the Owner to continuously meet permit conditions. Temporary mechanical, electrical and instrumentation installations/connections shall be subject to review and acceptance by the Owner. All such temporary work shall be provided at no change in the Contract time or price.

H. At no time shall the Contractor undertake to close off any pipelines, or open valves, or take any other action which would affect the operation of the existing treatment plant.

1.03 GENERAL OPERATING AND CONSTRUCTION REQUIREMENTS

A. Access to Plant Site, Roadways, and Parking Areas

1. An unobstructed traffic route through the Main Gate shall be maintained at all times for the Owner's operations personnel and maintenance equipment. The Contractor shall be responsible for providing access to and for preparing and maintaining/approved parking areas.

2. An unobstructed traffic route around the plant site shall be maintained at all times for the Owner's operations personnel and maintenance equipment. Vehicular access to the treatment units and buildings for Owner personnel shall be maintained at all times by the Contractor.

3. The Contractor shall provide temporary measures to protect the existing pavement by filling over with earthen material or supplying other measures acceptable to the Owner, and shall repair any damage to existing paved surfaces that occurs during the construction period. Any areas disturbed along the shoulders of the access road and interior roads and elsewhere inside and outside of the plant shall be repaired, graded, seeded, etc. as necessary to match pre-existing conditions.

4. The Contractor shall not undertake the restoration of roadway (new pavement or asphalt resurfacing) shown on the Contract Drawings, until all other work on the facility improvements has been completed. Contractor shall coordinate work within EWRF access road to provide continuous use of this road for facility staff, maintenance, and operations. This can be accomplished through construction sequencing or temporary means coordinated with the Engineer and Owner.

B. Personnel Access

1. Treatment plant personnel shall have access to all areas which remain in operation throughout the construction period. The Contractor shall locate stored material, dispose of construction debris and trash, provide temporary walkways, provide temporary lighting, and other such work as directed by the Owner to maintain

personnel access to areas in operation. Access and adequate parking areas for plant personnel must be maintained throughout construction.

C. Plumbing Facilities

1. Unless otherwise allowed by the Owner, sanitary facilities in the existing structures shall be operational at all times for plant operating personnel only.

D. Power, Light and Communications Systems

1. Electric power, lighting service and communications systems shall be maintained in uninterrupted operation in all areas which remain in operation. Individual units may be disconnected as required for replacement, but service shall be available at all times including periods when plant elements are out of service. Shutdown of electrical facilities shall be limited to not more than two (2) hours. The Owner may allow longer outages under conditions determined by the Owner. All costs associated with use of temporary services or standby engine generators shall be paid by the Contractor. The Contractor shall coordinate shutdowns required with the Owner to minimize the total number of shutdowns required to complete construction. Owner's phone service to and within the plant shall be maintained in continuous operation during construction.

1.04 SPECIFIC OPERATIONAL CONSTRAINTS

A. The Contractor shall schedule the work for the following based on the constraints given in such a manner as to maintain the wastewater treatment plant in continuous operation. Any shutdowns, or interruptions to the plant process, shall be indicated to the Owner and Engineer in a shutdown plan. Contractor shall submit an organized shutdown plan to indicate what work is to be performed, how the work is to be completed and anticipated durations of the work.

B. Reaeration Air Maintenance

1. Notice to Plant Staff

a. The CONTRACTOR shall provide notice to OWNER for any work that will require temporarily shutdown of reaeration system. The reaeration system may only be shut down for a maximum period of 2 hours to perform tie-ins, electrical connections, and/or to connect a temporary blower.

b. The CONTRACTOR must provide 24 hours advance notice to the OWNER by the CONTRACTOR of their intentions to temporarily shut down the reaeration system.

2. Reaeration Air Maintenance Plan

A Reaeration Air Maintenance Plan shall be submitted and approved by the ENGINEER prior to execution of the work. The reaeration air maintenance plan

shall include the following information:

a. The reaeration air maintenance plan shall include methods for maintaining air flow to the reaeration zone during the time the associative work specified within this contract may be performed. The Contractor shall be responsible for keeping air flow continuously conveyed by use of a temporary blower as described herein.

b. Step-by-step detailed sequence for performing the work.

c. Anticipated duration of each activity.

d. Documentation on all temporary blower equipment to be utilized by the Contractor, including blower, motor, inlet air filter assembly, inlet and outlet butterfly valves, and surge control panel and piping.

e. For temporary blowers, submit the following:

   1) Quantity, manufacturer and model. Provide sufficient number of blowers to provide standby capacity equal to at least 100 percent of required aeration capacity. The capacity shall be in such that in the occurrence of a blower outage, 100 percent of the required airflow has the capabilities of being conveyed through the operation. At minimum, there shall be one (1) temporary blower as well as (1) backup temporary blower of equal capacity for back-up full redundant capacity available at all times.

   2) System and certified performance curves to demonstrate that blowers are sized correctly.

   3) Type of electric drive units including details on Contractor's temporary electrical power source and proposed means to provide switchover to the backup unit upon failure of the duty unit.

   4) Pipe materials, layout, supports, thrust restraint, and required fittings and appurtenances.

f. Plan and/or schematic drawings to clearly identify work to be performed. Sequence steps shall be identified on drawings using a keynote legend or similar means.

g. Backup, and emergency means and methods. Provide a reliable means to alert Contractor personnel of failure of the system such that aeration is not interrupted for more than 2 hours (autodialer, automated controls, manned equipment), 24 hours a day, 7 days a week.

h. Proposed operations and staffing for temporary systems for continuous operation to maintain required reaeration service. Proposed plan shall include emergency plan in case of equipment failure. No plant operation staff shall be relied upon for assistance.

3. Temporary Blower(s)

a. The CONTRACTOR must maintain the airflow to the Reaeration Zones by providing temporary blower equipment including blower(s), motor, inlet air filter assembly, inlet butterfly valve, and surge control panel, piping and other equipment required to provide full redundant reaeration capacity.

b. The CONTRACTOR shall provide a minimum of one (1) temporary blower with a fully redundant in-line spare. Full redundant capacity must be online at all times. Each blower must be able to meet the following design conditions:

1) Flow: 350 SCFM

2) Pressure: 6.6 psig

c. Maximum motor horsepower shall be no more than 50 horsepower. Power shall be supplied through an existing spare breaker at the existing MCC as indicated on the drawings. Provide all conduit, cable, controls, hardware, and labor to connect adequate and safely protected power to the blowers.

4. Inspection and Maintenance

a. The CONTRACTOR shall be responsible for inspecting, maintaining, and operating the temporary reaeration system. If the Contractor is not on site, they shall check the temporary blower operation twice a day, once before starting work and once after the day is completed. This includes twice a day on weekends.

1) When the temporary blower equipment is not fully operational, the CONTRACTOR shall notify OWNER's Plant supervisor immediately.

2) The CONTRACTOR shall repair their temporary blower equipment and notify the Plant supervisor that the equipment is back in full operation.

5. Documentation

a. A log book shall be kept at the site, in a safe and dry area, that is filled in and signed every time the blowers are checked or tested by the CONTRACTOR. The OWNER's construction inspector shall review the log book during normal inspections to confirm that the CONTRACTOR is completing the documentation. If not, the CONTRACTOR and the project manager shall be notified of the delinquency by the inspector in writing. This documentation is to ensure the CONTRACTOR is following the protocol.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION –

SECTION 01530

PROTECTION OF EXISTING FACILITIES

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Contractor shall be responsible for the preservation and protection of property adjacent to the work site against damage or injury as a result of his operations under this Contract. Any damage or injury occurring on account of any act, omission or neglect on the part of the Contractor shall be restored in a proper and satisfactory manner or replaced by and at the expense of the Contractor to an equal or superior condition than previously existed.

B. Contractor shall comply promptly with such safety regulations as may be prescribed by the Owner or the local authorities having jurisdiction and shall, when so directed, properly correct any unsafe conditions created by, or unsafe practices on the part of, his employees. In the event of the Contractor's failure to comply, the Owner may take the necessary measures to correct the conditions or practices complained of, and all costs thereof will be deducted from any monies due the Contractor. Failure of the Owner to direct the correction of unsafe conditions or practices shall not relieve the Contractor of his responsibility hereunder.

C. In the event of any claims for damage or alleged damage to property as a result of work under this Contract, the Contractor shall be responsible for all costs in connection with the settlement of or defense against such claims. Prior to commencement of work in the vicinity of property adjacent to the work site, the Contractor, at his own expense, shall take such surveys as may be necessary to establish the existing condition of the property. Before final payment can be made, the Contractor shall furnish satisfactory evidence that all claims for damage have been legally settled or sufficient funds to cover such claims have been placed in escrow, or that an adequate bond to cover such claims has been obtained.

1.02 PROTECTION OF WORK AND MATERIAL

A. During the progress of the work and up to the date of final payment, the Contractor shall be solely responsible for the care and protection of all work and materials covered by the Contract.

B. All work and materials shall be protected against damage, injury or loss from any cause whatsoever, and the Contractor shall make good any such damage or loss at his own expense. Protection measures shall be subject to the approval of the Owner.

1.03 BARRICADES, WARNING SIGNS AND LIGHTS

A. The Contractor shall provide and maintain such other warning signs and barricades in areas of and around their respective work as may be required for the safety of all those employed in the work, the Owner's operating personnel, or those visiting the site.

B. In the case of a conflict between this Specification Section and the Contractor's Safety Plan, the more stringent requirement of the two documents shall govern.

1.04 EXISTING UTILITIES AND STRUCTURES

A. The term existing utilities shall be deemed to refer to both publicly-owned and privately-owned utilities such as electric power and lighting, telephone, water, gas, storm drains, process lines, sanitary sewers and all appurtenant structures.

B. Where existing utilities and structures are indicated on the Drawings, it shall be understood that all of the existing utilities and structures affecting the work may not be shown and that the locations of those shown are approximate only. It shall be the responsibility of the Contractor to ascertain the actual extent and exact location of existing utilities and structures. In every instance, the Contractor shall notify the proper authority having jurisdiction and obtain all necessary directions and approvals before performing any work in the vicinity of existing utilities.

C. Prior to beginning any excavation work, the Contractor shall, through field investigations, determine any conflicts or interferences between existing utilities and new utilities to be constructed under this project. This determination shall be based on the actual locations, elevations, slopes, etc., of existing utilities as determined in the field investigations, and locations, elevation, slope, etc. of new utilities as shown on the Drawings. If an interference exists, the Contractor shall bring it to the attention of the Owner as soon as possible. If the Owner agrees that an interference exists, he shall modify the design as required. Additional costs to the Contractor for this change shall be processed through a Change Order as detailed elsewhere in these Contract Documents.

D. The work shall be carried out in a manner to prevent disruption of existing services and to avoid damage to the existing utilities. Temporary connections shall be provided, as required, to insure uninterruption of existing services. Any damage resulting from the work of this Contract shall be promptly repaired by the Contractor at his own expense in a manner satisfactory to the Owner or the respective authority having jurisdiction over such work. Where it is required by the authority having jurisdiction that they perform their own repairs or have them done by others, the Contractor shall be responsible for all costs thereof.

E. Where excavations by the Contractor require any utility lines or appurtenant structures to be temporarily supported and otherwise protected during the construction work, such support and protection shall be provided by the Contractor. All such work shall be performed in a manner satisfactory to the Owner or the respective authority having jurisdiction over such work. In the event the Contractor fails to provide proper support or protection to any existing utility, the Owner may, at his discretion, have the respective authority to provide such support or protection as may be necessary to insure the safety of such utility, and the costs of such measures shall be paid by the Contractor.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -

SECTION 01540

DEMOLITION OF EXISTING STRUCTURES AND EQUIPMENT

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. This Section covers the demolition, removal, and disposal of existing structures, pavement, curbs, and sidewalk, removal and disposal of hazardous materials, and any existing equipment including electrical equipment and piping not required for the operation of EWRF as indicated on the Drawings and as specified hereinafter. The Contractor shall furnish all labor, materials and equipment to demolish buildings and structures and to remove fixtures, anchors, supports, piping and accessories designated to be removed on the Drawings.

B. The disposal of all removed items shall be in accordance with all Federal, State and local laws including but not limited to RCRA, Toxic Substance Control Act (STSCA), Hazardous Materials Transportation Act (HMTA), USEPA and the Florida Department of Environmental Protection Solids and Hazardous Waste Section Regulations in effect as of the date of the disposal.

C. Prior to beginning any work associated with existing facilities to be abandoned, salvaged, or otherwise removed, the Contractor shall inform the Owner before disconnecting electrical service (where appropriate), isolating pipelines (where possible) or otherwise removing existing facilities from service to the extent possible. The Contractor shall not proceed without written authorization from the Owner on any demolition activity.

1.02 SUBMITTALS

A. The Contractor shall submit for approval, in accordance with Section 01300 entitled "Submittals", the proposed methods, equipment and a Demolition, Salvage, and Removal Plan at least twenty (20) days prior to any demolition work. Include coordination for shut-off, temporary services, continuation of service and other applicable items to ensure no interruption of plant operations except as hereinbefore specified.

1.03 TITLE TO EQUIPMENT AND MATERIALS

A. Contractor shall have no right or title to any of the equipment, materials or other items to be removed from the existing structures unless and until said equipment, materials and other items have been removed from the premises. The Contractor shall not sell or assign, or attempt to sell or assign any interest in the said equipment, materials or other items until the said equipment, materials or other items have been removed.

B. Contractor shall have no claim against the Owner because of the absence of such fixtures and materials.

1.04 CONDITION OF STRUCTURES AND EQUIPMENT

A. The Owner does not assume responsibility for the actual condition of structures and equipment to be demolished and removed.

B. Conditions existing at the time of inspection for bidding purposes will be maintained by the Owner so far as practicable.

C. The information regarding the existing structures and equipment shown on the Drawings is based on visual inspection and a walk-through survey only. The Owner will not be responsible for interpretations or conclusions drawn therefrom by the Contractor.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

3.01 DEMOLITION AND REMOVALS

A. The removal of all equipment and piping, and all materials from the demolition of buildings and structure shall, when released by the Owner, shall be done by the Contractor and shall become the Contractor's property, unless otherwise noted, for disposition in any manner not contrary to the Contract requirements and shall be removed from the site to the Contractor's own place of disposal.

B. The Contractor, through a licensed electrician, shall de-energize all panelboards, lighting fixtures, switches, circuit breakers, electrical conduits, motors, limit switches, pressure switches, instrumentation such as flow, level and/or other meters, wiring, and similar power equipment prior to removal. Any electric panels or equipment which are to be retained shall be relocated or isolated by a licensed electrician prior to the removal of the equipment specified herein. All existing electrical equipment to be removed shall be removed with such care as may be required to prevent unnecessary damage, to keep existing systems in operation and to keep the integrity of the grounding systems.

C. Conduits and wires shall be abandoned or removed where noted or as shown on the Drawings. All wires in abandoned conduits shall be removed. Abandoned conduits concealed in floor or ceiling slabs or in walls, shall be cut flush with the slab or wall at the point of entrance. The conduits shall be suitably plugged and the area repaired in a flush, smooth, approved manner. Exposed conduits and their supports shall be disassembled and removed from the project site. Repair all areas of removal to prevent rust spots on exposed surfaces.

D. The Contractor shall proceed with the removal of the equipment, piping and appurtenances in a sequence designed to maintain the plant in continuous operation as described in Section 01520 entitled "Maintenance of Utility Operations During Construction", and shall proceed only after approval of the Owner.

E. Any equipment piping and appurtenances removed without proper authorization, which are necessary for the operation of the existing facilities, shall be replaced to the satisfaction of the Owner at no cost to the Owner.

F. Excavation caused by demolitions shall be backfilled with fill free from rubbish and debris.

G. At least 48 hours prior to commencement of a demolition or removal, the Contractor shall notify the Owner in writing of his proposed schedule. No removals shall be started until it is acceptable to the Owner.

3.02 PROTECTION

A. Demolition and removal work shall be performed by competent experienced workmen for the various type of demolition and removal work and shall be carried out through to completion with due regard to the safety of Owner employees, workmen on-site and the public. The work shall be performed with as little nuisance as possible.

B. The work shall comply with the applicable provisions and recommendation of ANSI A10.2, Safety Code for Building Construction, all governing codes, and as hereinafter specified.

C. The Contractor shall make such investigations, explorations and probes as are necessary to ascertain any required protective measures before proceeding with demolition and removal. The Contractor shall give particular attention to shoring and bracing requirements so as to prevent any damage to new or existing construction.

D. The Contractor shall provide, erect, and maintain catch platforms, lights, barriers, weather protection, warning signs and other items as required for proper protection of the public, occupants of the building, workmen engaged in demolition operations, and adjacent construction.

E. The Contractor shall provide and maintain weather protection at exterior openings so as to fully protect the interior premises against damage from the elements until such openings are closed by new construction.

F. The Contractor shall provide and maintain temporary protection of the existing structure designated to remain where demolition, removal and new work is being done, connections made, materials handled or equipment moved.

G. The Contractor shall take necessary precautions to prevent dust from rising by wetting demolished masonry, concrete, plaster and similar debris. Existing electrical and mechanical equipment to remain shall be protected from damage, dust, and debris.

H. The Contractor shall provide adequate fire protection in accordance with local Fire Department requirements.

I. The Contractor shall not close or obstruct walkways, passageways, or stairways and shall not store or place materials in passageways, stairs or other means of egress. The Contractor shall conduct operations with minimum traffic interference.

J. The Contractor shall be responsible for any damage to the existing structure or contents by reason of the insufficiency of protection provided.

3.03 WORKMANSHIP

A. The demolition and removal work shall be performed as described in the Contract Documents. The work required shall be done with care, and shall include all required shoring, bracing, etc. The Contractor shall be responsible for any damage which may be caused by demolition and removal work to any part or parts of existing structures or items designated for reuse or to remain. The Contractor shall perform patching, restoration and new work in accordance with applicable Technical Sections of the Specifications and in accordance with the details shown on the Drawings.

B. All supports, pedestals and anchors shall be removed with the equipment and piping unless otherwise specified or required. Concrete bases, anchor bolts and other supports shall be removed to approximately 1-inch below the surrounding finished area and the recesses shall be patched to match the adjacent areas. Wall sleeves and castings shall be plugged or blanked off, all openings in concrete shall be closed in a manner meeting the requirements of the appropriate Sections of these Specifications, as shown on the Drawings, and as directed and approved by the Owner.

C. Materials or items designated to remain the property of the Owner shall be as hereinafter tabulated. Such items shall be removed with care and stored at a location at the site to be designated by the Owner.

D. Where equipment is shown or specified to be removed and relocated, the Contractor shall not proceed with removal of this equipment without specific prior approval of the Owner. Upon approval, and prior to commencing removal operations, the equipment shall be operated in the presence of representatives of the Contractor and Owner. Such items shall be removed with care, under the supervision of the trade responsible for reinstallation and protected and stored until required. Material or items damaged during removal shall be replaced with similar new material or item. Any equipment that is removed without proper authorization and is required for plant operation shall be replaced at no cost to the Owner.

E. Materials or items demolished and not designated to become the property of the Owner or to be reinstalled shall become the property of the Contractor and shall be removed from the property and legally disposed of.

F. The Contractor shall execute the work in a careful and orderly manner, with the least possible disturbance to the public and to the occupants of the building.

G. Where alterations occur, or new and old work join, the Contractor shall cut, remove, patch, repair or refinish the adjacent surfaces to the extent required by the construction conditions, so as to leave the altered work in as good a condition as existed prior to the start of the work. The materials and workmanship employed in the alterations, unless otherwise shown on the Drawing or specified, shall comply with that of the various respective trades which normally perform the particular items or work.

H. The Contractor shall finish adjacent existing surfaces to new work to match the specified finish for new work as shown in the Contract Documents. The Contractor shall clean existing surfaces of dirt, grease, loose paint, etc., before refinishing.

I. The Contractor shall remove temporary work, such as enclosures, signs, guards, and the like when such temporary work is no longer required or when directed at the completion of the work.

3.04 MAINTENANCE

A. The Contractor shall maintain the buildings, structures and public properties free from accumulations of waste, debris and rubbish, caused by the demolition and removal operations. The Contractor shall provide on-site dump containers for collection of waste materials, debris and rubbish, and he shall wet down dry materials to lay down and prevent blowing dust. At reasonable intervals during the progress of the demolition and removal work or as directed by the Owner, the Contractor shall clean the site and properties, and dispose of waste materials, debris and rubbish.

3.05 JOB CONDITIONS

A. The Contractor shall execute the demolition and removal work to prevent damage or injury to structures, occupants thereof and adjacent features which might result from falling debris or other causes, and so as not to interfere with the use, and free and safe passage to and from adjacent structures.

B. Closing or obstructing of roadways adjacent to the work by the placement or storage of materials will not be permitted. All operations shall be conducted with a minimum interference to traffic on these ways.

C. Repair damage done to facilities to remain and any property belonging to others damaged by construction demolition activities.

D. The Contractor shall carry out their operations so as to avoid interference with operations and work in the existing facilities.

E. Prior to commencement of a demolition or removal, the Contractor must obtain approval of their proposed demolition schedule. No removals shall be started until it is acceptable to the Owner.

F. The Contractor shall comply with and have the approved written and posted Confined Space Entry Space Procedures at the project site at all times as required by OSHA 29 CFR 1910.146. The Contractor shall also comply with any state and/or local requirements if more restrictive than the federal requirements.

G. The Contractor shall comply with safe working practices for abrasive blasting, cleaning, burning, welding, and handling lead based and non-lead based coated steel and all health and safety regulations and requirements of Federal OSHA 29 CFR 1926.62, Interim Final Rule on Lead in Construction, state and local health regulatory agencies, Material Safety Data Sheets (MSDS), and the paint and abrasive manufacturers. This requirement shall be accomplished without supervision from the Owner. All rigging attachments shall be

carefully inspected by the Contractor prior to use. The Contractor assumes all responsibility for use of any or added attachments.

H. The Contractor shall comply with all local, state and federal regulations concerning emissions or disposal of solid, particulate, liquid, or gaseous matter as a result of the demolition operations. This compliance shall be accomplished without supervision from the Owner. No additional compensations for changes in the laws, regulations, or the interpretation thereof shall be granted by the Owner. No burning of trash on the site shall be permitted. Any fines imposed on the Owner by any regulatory agency as a result of the Contractor's non-compliance with environmental regulations shall be paid or reimbursed by the Contractor.

I. Welding or Cutting Operations: Provide adequate worker protection and assure proper personal hygiene practices are followed in accordance with the instructions in ANSI Z49.1, "Safety in Welding and Cutting" and in OSHA 29 CFR 1926.62, Interim Final Rule on lead in construction.

J. Explosives shall not be used in the execution of this Contract.

3.06 SALVAGE OF MATERIALS

A. The Owner reserves the right to keep any materials and equipment scheduled for demolition. The approved demolition plan shall include a two-week period prior to commencement of demolition work to allow the Owner’s staff time to remove any portable items the Owner wishes to retain.

B. As part of the review process for the Contractor’s proposed demolition plan, the Owner will provide a final list of non-portable materials and/or equipment that are to be packaged and delivered to the Owner at the plant site at a location as directed by the Owner within the site. The Contractor shall remove, package, and deliver the salvaged materials to the designated site(s) estimated to be within 10 miles of the construction site.

1. Electrical gear

2. Reaeration centrifugal blowers

- END OF SECTION -

SECTION 01541

FIELD SURVEYING

PART 1 - GENERAL

1.01 REQUIREMENT

A. Provide surveying services required for proper layout of work and record information.

1.02 QUALITY CONTROL

A. A Land Surveyor Registered in the State of Florida shall be used for verifying existing control points and establishing new control points. Contractor shall be responsible to verify the accuracy of the established control points prior to performing layout.

1.03 SUBMITTALS

A. Submit name, address, and telephone number of Registered Land Surveyor to the Engineer before starting work.

B. On request, submit documentation verifying accuracy of survey work for project boundary and vertical and horizontal control.

C. Submit monthly, on-going, record drawing files of all installed work. All work shall be surveyed for accurate locations within the month following installation of the work. Submit survey files as electronic files in AutoCad 2010 dwg to the Engineer along with, or prior to each monthly pay application. Payment may be withheld if sufficient survey efforts are not made and data accurately and legibly recorded each month.

D. Submit a certification letter with each survey file submitted, signed by the Surveyor, certifying that elevations and locations of improvements are in conformance with Contract Documents, with any significant deviations clearly listed and described in the certification letter.

E. All buried, subsurface work shall be surveyed by the Surveyor in sufficient detail to locate the buried work. For pipelines, survey information shall be provided indicating the top of and coordinate location of each fitting and valve at a noted point on the fitting or valve, typically along the centerline and/or intersection of centerlines for bends. Location and top of pipe shall be recorded at a minimum of every 50 feet of straight run of piping that otherwise contains no fitting or valve. Survey work for such locations shall be completed prior to burying the work or within 1 week after installation with temporary markers allowing accurate location of each item if the work has to be buried immediately.

F. All surface visible work shall be surveyed in sufficient detail to locate all new facilities, structures, buildings, tanks, piping, slabs, valve boxes, vaults, grade contours, roadways, equipment, and fencing. Survey efforts shall be made monthly for all work that is complete after settling has occurred for structures and after pavement has been place for roadways and any valve boxes or vaults located within paved areas.

1.04 PROJECT RECORD DOCUMENTS

A. Maintain complete, accurate log of control and survey work as it progresses as noted above. Incorporate changes made by Field Order, Change Order, or Construction Change Directive. Incorporate details generated during the construction phase not shown on the original Contract Drawings.

B. Maintain one set of plans that all record drawing information is kept on, included legibly recorded data from survey work which indicates changes from the original locations noted on the Drawings, including any deviations for locations of existing buried or above ground infrastructure or contours. These plans shall show the record information within one week of installation of work or information being made available. Contractor's record drawing markups shall be available for review by the Owner at any time during the normal workday. Failure to maintain the record drawing set may be cause to delay payment until the record drawing set is brought up to date.

C. Submit record drawing markups as specified in Section 01700 entitled "Contract Closeout".

PART 2 – PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

3.01 INSPECTION

A. Verify locations of survey control points prior to starting work.

B. Promptly notify Owner of any discrepancies discovered.

3.02 SURVEY REFERENCE POINTS

A. Protect survey control points prior to starting site work; preserve permanent reference points during construction. Make no changes without prior written notice to Owner.

B. Promptly report to Owner the loss or destruction of any reference point or relocation required because of changes in grades or other reasons. Replace dislocated survey control points based on original survey control.

3.03 SURVEY REQUIREMENTS

A. Utilize established bench marks for vertical and horizontal control during construction using or converting to North American Vertical Datum of 1988 (NAVD-88). Contractor shall be responsible for laying out the work, shall protect and preserve the established bench mark and shall make no changes or relocations without prior approval of Owner. Contractor shall report to Owner whenever any reference point 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 by professionally qualified personnel.

B. Contractor shall establish line and levels, locate and lay out by instrumentation and similar appropriate means:

1. Site improvements, including pavements, stakes for grading, fill and topsoil placement, utility locations, slopes, and invert, or centerline, elevations.

2. Grid or axis for structures.

3. Piping locations, slopes, and invert, or centerline, elevations.

C. Periodically verify layouts by same means.

D. Contractor shall provide and incorporate into record drawing markups the horizontal and vertical record locations of improvements, including the following:

1. Top elevations of structures.

2. Pipe coordinates at changes in direction.

3. Coordinates of buried valves, tees and fittings.

4. All underground piping invert or centerline elevations including at changes in slope.

5. All underground pipe invert or centerline elevations at tees.

6. Pipe invert, or centerline, elevations at crossing with other pipe.

7. Invert, or centerline, elevations and coordinates of existing pipe at crossing with underground pipe installed under this project.

8. Other horizontal and vertical record data pertinent to completed Work.

9. Location of existing buried work crossing all new buried work.

E. Ground surface record/information shall include the following:

1. All elevations shown on the construction drawings shall be confirmed or amended on the record drawing markups if finished elevations are different.

- END OF SECTION -

SECTION 01550

SITE ACCESS AND STORAGE

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Access Roads

1. If required, the General Contractor shall construct and maintain such temporary access roads as required to perform the work of this Contract.

2. Access roads, where possible, shall be located over the areas of the future road system.

3. Access roads shall be located within the property lines of the Owner.

4. Existing access roads used by the Contractor shall be suitably maintained by the Contractor at his expense during construction. Contractor shall not be permitted to restrict Owner access to existing facilities. Engineer may direct Contractor to perform maintenance of existing access roads when Engineer determines that such work is required to insure all weather access by the Owner.

B. Equipment and Services

1. Contractor shall provide a first aid cabinet conforming to the OSHA requirements.

C. Parking Areas

1. Each Contractor shall construct and maintain suitable parking areas for his construction personnel on the project site where approved by the Engineer and the Owner.

D. Restoration

1. At the completion of the work, the surfaces of land used for access roads and parking areas shall be restored by each Contractor to its original condition and to the satisfaction of the Engineer. At a minimum, such restoration shall include establishment of a permanent ground cover adequate to restrain erosion for all disturbed areas.

E. Traffic Regulations

1. Contractor shall obey all traffic laws and comply with all the requirements, rules and regulations of the Owner, the S.C. Department of Transportation, and other local authorities having jurisdiction to maintain adequate warning signs, lights, barriers, etc., for the protection of traffic on public roadways.

2. Contractor shall strictly follow the listed plant speed limit of 10 mph, and shall be aware of pedestrian and cart traffic.

F. Security Gate Access

1. Contractor shall develop a list of all anticipated subcontractors anticipated to be on site during the project and shall inform all workers, subcontractors, or other individuals of sign-in requirements at front gate. Contractor shall keep an accurate headcount of all personnel and inform plant staff/security of any changes to the list of subcontractors prior to their arrival.

1.02 STORAGE OF EQUIPMENT AND MATERIALS

A. General

1. Contractor shall store his equipment and materials at the job site in accordance with the requirements of the General Conditions, the Supplemental Conditions, and as hereinafter specified. All equipment and materials shall be stored in accordance with manufacturer's recommendations and as directed by the Owner or Engineer, and in conformity to applicable statutes, ordinances, regulations and rulings of the public authority having jurisdiction. Where space or strip heaters are provided within the enclosure for motors, valve operators, motor starters, panels, instruments, or other electrical equipment, the Contractor shall make connections to these heaters from an appropriate power source and operate the heaters with temperature control as necessary until the equipment is installed and being operated according to its intended use.

2. Contractor shall enforce the instructions of Owner and Engineer regarding the posting of regulatory signs for loadings on structures, fire safety, and smoking areas.

3. Contractor shall not store materials or encroach upon private property without the written consent of the owners of such private property.

4. Contractor shall not store unnecessary materials or equipment on the job site, and shall take care to prevent any structure from being loaded with a weight which will endanger its security or the safety of persons.

5. Materials shall not be placed within ten (10) feet of fire hydrants. Gutters, drainage channels and inlets shall be kept unobstructed at all times.

6. Contractor shall provide adequate temporary storage buildings/facilities, if required, to protect materials or equipment on the job site.

7. Owner shall not be responsible for the unloading or receipt of materials delivered to the project site. Contractor shall retain full responsibility to coordinate and schedule the delivery, unloading and placement of equipment and materials in storage during the normal time of work.

B. Site Specific Requirements

1. Available access and laydown areas are shown on the Contract Drawings. Contractor shall delineate this area, and is solely responsible for any stormwater measures required due to land disturbance. No other onsite space will be allowed without written permission from the Owner.

2. Contractor shall be aware of the truck routes and parking areas currently utilized onsite, and shall take all necessary measures to limit impacts to these routes.

3. All materials are to be stored in accordance with manufacturer's recommendations and these specifications. Contractor shall coordinate laydown requirements between the available space, as shown on the Contract Drawings, and the manufacturer's recommendations for handling and storage.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -

SECTION 01600

MATERIALS AND EQUIPMENT

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The word "Products," as used herein is defined to include purchased items for incorporation into the Work, regardless of whether specifically purchased for project or taken from Contractor's stock of previously purchased products. The word "Materials," is defined as products which must be substantially cut, shaped, worked, mixed, finished, refined, or otherwise fabricated, processed, installed, or applied to form units of Work. The word "Equipment" is defined as products with operational parts, regardless of whether motorized or manually operated, and particularly including products with service connections (wiring, piping, and other like items). Definitions in this paragraph are not intended to negate the meaning of other terms used in Contract Documents, including "specialties," "systems," "structure," "finishes," "accessories," "furnishings," special construction," and similar terms, which are self-explanatory and have recognized meanings in the construction industry.

B. Equipment Specifications may not deal individually with minor items required such as components, parts, controls, and devices which may be required to produce the equipment performance specified or as required to meet the equipment warranties. Where such items are required, they shall be included by the supplier of the equipment, whether or not specifically called for in the Contract Documents.

C. All equipment, materials, instruments or devices incorporated in this project shall be new and unused, unless indicated otherwise in the Contract Documents. Equipment and materials to be incorporated into the work shall be delivered sufficiently in advance of their installation and use to prevent delay in the execution of the work, and they shall be delivered as nearly as feasible in the order required for executing the work.

D. Where the words "furnish", "provide", "supply", "replace", or "install" are used, whether singularly or in combination, they shall mean to furnish and install, unless specifically stated otherwise. In the interest of brevity, the explicit direction "to furnish and install" has sometimes been omitted in specifying materials and/or equipment herein. Unless specifically noted otherwise, it shall be understood that all equipment and/or materials specified or shown on the Drawings shall be furnished and installed under the Contract as designated on the Drawings.

E. The Contractor shall protect all equipment and materials from deterioration and damage, including provisions for temporary storage buildings as needed and as specified in Section 01550 entitled "Site Access and Storage". Storage of equipment and materials shall be in locations completely protected from flooding, standing water, excessive dust, falling rock, brush fire, etc. Storage areas shall be located sufficiently distant from all construction activities and the movement of construction vehicles to minimize the potential for accidental damage. Any equipment or materials of whatever kind which may have

become damaged or deteriorated from any cause shall be removed and replaced by good and satisfactory items at the Contractor's expense for both labor and materials.

1.02 INSTALLATION OF EQUIPMENT

A. Equipment and materials shall be installed in accordance with the requirements of the General Conditions, Supplemental Conditions and the respective Specification Sections.

B. Concrete foundations for equipment shall be of approved design and shall be adequate in size, suitable for the equipment erected thereon, properly reinforced, and tied into floor slabs by means of reinforcing bars or dowels. Foundation bolts of ample size and strength shall be provided and properly positioned by means of suitable templates and secured during placement of concrete. Foundations shall be built and bolts installed in accordance with the manufacturer's certified drawings.

C. Before mounting equipment on a foundation, the Contractor shall clean the top surface; if necessary, rough it with a star chisel and clean again; and clean out all foundation bolt sleeves. The Contractor shall provide a sufficient number of stainless steel plate shims about 2-inches wide and 4-inches long, and of a varying thickness from 1/8 to 1/2 inch. A combination of these shims shall be placed next to each foundation bolt to bring the bottom of the bedplate or frame about 1/8 inch above the final setting. The equipment shall be lowered by changing the combination of shims. Using stainless steel shim stock of various thicknesses, continue to level the equipment a little at a time and in rotation until it is at the correct elevation in both directions. When the equipment is level, tighten down on the foundation bolts a little at a time in rotation to make certain the equipment remains level and does not shift on the shims. A preliminary alignment check shall be made before grout is placed.

D. Equipment shall be set, aligned and assembled in conformance with manufacturer's drawings or instructions. Run out tolerances by dial indicator method of alignment shall be plus or minus .002 inches, unless otherwise directed by the Owner.

E. All blocking and wedging required for the proper support and leveling of equipment during installation shall be furnished by the Contractor. All temporary supports shall be removed, except stainless steel wedges and shims, which may be left in place with the approval of the Owner.

F. Each piece of equipment or supporting base, bearing on concrete foundations, shall be bedded in grout. The Contractor shall provide a minimum of 1-1/2-inch thick grouting under the entire baseplate supporting each pump, motor drive unit and other equipment. Grout shall be non-shrink grout, as specified under Section 03315 entitled "Grout".

G. When motors are shipped separately from driven equipment, the motors shall be received, stored, meggered once a month, and the reports submitted to the Owner. After driven equipment is set, the motors shall be set, mounted, shimmed, millrighted, coupled and connected complete. Motors shall then be turned once per month and documented by the Contractor to the Owner.

1.03 CONNECTIONS TO EQUIPMENT

A. Connections to equipment shall follow manufacturer's recommendations as to size and arrangement of connections and/or as shown in detail on the Drawings or approved Shop Drawings. Piping connections shall be made to permit ready disconnection of equipment with minimum disturbance of adjoining piping and equipment.

B. The Contractor shall be responsible for bringing proper electrical service to each item of equipment requiring electrical service as shown on the Drawings or approved Shop Drawings. Electrical connections to equipment requiring electrical service shall be made by a qualified electrician.

1.04 SOURCE OF SUPPLY AND QUALITY REQUIREMENTS

A. Approved Materials: Only materials conforming to the requirements of the specifications and approved by the Owner shall be used in the Work. Any materials proposed for use may be inspected or tested at any time during their preparation and use. No material which, after approval, has in any way become unfit for use shall be used in the work. Materials containing asbestos will not be allowed.

B. Notification of Placing Order: The Contractor shall give sufficient notification of the placing of orders for materials and shall order materials sufficiently in advance of their incorporation in the Work to allow time for sampling and testing.

C. Approval of Source of Supply: Representative preliminary samples, of the character and quantity prescribed, shall be submitted by the Contractor or producer for examination, and will be tested in accordance with the standard methods. If, after trial, it is found that a source of supply which has been approved does not furnish a uniform product, or if the product from any source proves unacceptable at any time, the Contractor shall furnish material from other approved sources.

D. General: If the volume, progress of the work, and other considerations warrant, the Owner may undertake the inspection of materials at the source of supply.

E. The Owner assumes no obligation to make such inspection of materials at the source of supply, and the responsibility for assuring that the materials are satisfactory rests entirely with the Contractor.

1.05 QUALITY ASSURANCE

A. Compatibility of Options: Where more than one choice is available as options for Contractor's selection of a product or material, Contractor shall select an option which is compatible with other products and materials already selected. Compatibility is a basic general requirement of product/material selection.

1.06 LUBRICANTS

A. During testing and prior to acceptance, the Contractor shall furnish all lubricants necessary for the proper lubrication of all equipment furnished under this Contract.

1.07 SPECIAL TOOLS

A. For each type of equipment furnished, the Contractor shall provide a complete set of all special tools (including calibration and test equipment) which may be necessary for the adjustment, operation, maintenance and disassembly of such equipment.

B. Special tools shall be delivered at the same time as the equipment to which they pertain. The Contractor shall properly store and safeguard such special tools until completion of the Work, at which time they shall be delivered to the Owner.

1.08 PROTECTION AGAINST ELECTROLYSIS

A. Where dissimilar metals are used in conjunction with each other, suitable insulation shall be provided between adjoining surfaces so as to eliminate direct contact and any resultant electrolysis. The insulation shall be bituminous impregnated felt, heavy bituminous coatings, nonmetallic separators or washers, or other acceptable materials.

1.09 FASTENERS

A. All necessary bolts, anchor bolts, nuts, washers, plates and bolt sleeves shall be furnished by the Contractor in accordance herewith. Bolts shall have suitable washers and, where so required, their nuts shall be hexagonal.

B. All bolts, anchor bolts, nuts, washers, plates, and bolt sleeves shall be Type 316 stainless steel unless otherwise specifically indicated or specified.

C. Unless otherwise specified, stud, tap, and machine bolts shall be of the best quality refined bar iron. Hexagonal nuts of the same quality of metal as the bolts shall be used.

1.10 EXCAVATED MATERIALS

A. Excavated suitable materials needed for backfilling operation shall be stored on site. Where additional area is needed for stockpiling, it shall be obtained by the Contractor.

B. Any excavated unsuitable backfill material shall be removed from the site and properly disposed of. Excess suitable backfill materials shall be delivered to a Owner site within 7 miles of the project site.

1.11 PROPOSED EQUIPMENT, SUPPLIERS, AND MATERIALS

A. The Technical Specifications include named manufacturers that were the basis of the design along with approved equals for the major equipment items and materials on this project. The Contractor shall use one of the named manufacturers unless substitute items are approved as specified herein.

1.12 SUBSTITUTION "OR EQUAL" ITEMS

A. Requests for substitutions of equipment or materials shall conform to the requirements of the General Conditions, Supplemental Conditions, and as hereinafter specified.

1. Contractor shall submit for each proposed substitution sufficient details, complete descriptive literature and performance data together with samples of the materials, where feasible, to enable the Owner and Engineer to determine if the proposed substitution is equal.

2. Contractor shall submit certified tests, where applicable, by an independent laboratory attesting that the proposed substitution is equal.

3. A list of installations where the proposed substitution is equal.

4. Requests for substitutions shall include full information concerning differences in cost, and any savings in cost resulting from such substitutions shall be passed on to the Owner.

B. Where the approval of a substitution requires revision or redesign of any part of the work, including that of other Contracts, all such revision and redesign, and all new drawings and details therefore, shall be provided by the Contractor at his own cost and expense, and shall be subject to the approval of the Owner and Engineer.

C. In the event that the Engineer is required to provide additional engineering services, then the Engineer's charges for such additional services shall be deducted from monies owed to the Contractor in accordance with the requirements of the General Conditions, and the Supplemental Conditions.

D. In all cases the Owner and Engineer shall be the judge as to whether a proposed substitution is to be approved. The Contractor shall abide by their decision when proposed substitute items are judged to be unacceptable and shall in such instances furnish the item specified or indicated. No substitute items shall be used in the work without written approval of the Owner and Engineer.

E. Contractor shall have and make no claim for an extension of time or for damages by reason of the time taken by the Engineer in considering a substitution proposed by the Contractor or by reason of the failure of the Engineer to approve a substitution proposed by the Contractor.

F. Acceptance of any proposed substitution shall in no way release the Contractor from any of the provisions of the Contract Documents.

G. Order of Precedence: Where a particular type or model number for an item of equipment is specified in addition to a word description of the item, it shall be understood that the word description and model number are intended to complement each other. If there is an apparent conflict or omission between the description and the model number specified, the more stringent requirement shall apply.

H. Variations from Specifications: All variations of the proposed substitute from that specified will be identified in the application, and available maintenance, repair, and replacement service will be indicated. The application shall also contain an itemized estimate of all costs that will result directly or indirectly from acceptance of such substitute, including costs of redesign and claims of subcontractors affected by the resulting change, all of which shall be considered by the Engineer in evaluation of the proposed substitute.

I. Means and Methods: If a specific means, method, technique, sequence, or procedure of construction is indicated in or required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, sequence, technique, or procedure of construction acceptable to the Engineer, if the Contractor submits sufficient information to allow the Engineer to determine that the substitute proposed is equivalent to that indicated or required by the Contract Documents.

1.13 REQUESTS FOR REVIEW OF SUBSTITUTIONS

A. General: Requests for review of substitute items of material and equipment will not be accepted from anyone other than the Contractor. If the Contractor wishes to furnish or use a substitute item of materials or equipment, Contractor shall make written application in the form of a standard submittal for acceptance thereof, certifying that the proposed substitute will perform its functions adequately and achieve the results called for by the general design, be of similar substance and quality to that specified, and be suited to the same use and capable of performing the same function as that specified. The application shall state that the evaluation and acceptance of the proposed substitute will not prejudice the Contractor's achievement of substantial completion or any completion milestone on time, whether or not acceptance of the substitute for use in the Work will require a change in any of the Contract Documents to adapt the design to the proposed substitute and whether or not incorporation or use of the substitute in connection with the Work is subject to payment of any license fee or royalty.

B. Form of Request: A request for substitution must be in writing in the form of a standard submittal and include descriptive literature, specifications, test report, or samples, as appropriate, to enable the Engineer to determine the acceptability of the product proposed for substitution. If substitution is requested as part of the Contractor's submittal of a proposed equivalent product, the item(s) proposed for substitution shall be clearly indicated. No substitute product shall be used on the Work until written approval has been received from the Engineer. Any revisions to any other portion of the Work made necessary by such substitution must be included in the submittal for the approval of the Engineer and all additional costs of these revisions shall be borne by the Contractor, including such calculations as may be required to substantiate performance.

B. Time for Review By Engineer: The Engineer shall be allowed a reasonable time within which to evaluate each proposed substitute. The Engineer shall be the sole judge of acceptability, and no substitute will be ordered, installed, or utilized without the Engineer’s prior written acceptance which will be evidenced by either a change order or a reviewed shop drawing marked either "FURNISH AS SUBMITTED" or "FURNISH AS CORRECTED." The Engineer shall not unreasonably withhold approval. The Engineer may require the Contractor to furnish at the Contractor's expense a special performance guarantee or other surety with respect to any substitute, the Engineer will record time required for evaluating substitutions proposed by the Contractor and in making changes in the Contract Documents occasioned thereby. Whether or not the Engineer accepts a proposed substitute, the Contractor shall reimburse the Onwer by way of deduct from monies owed the Contractor for the charges of the Engineer and/or the Engineer's consultants for evaluating each proposed substitute.

1.14 IDENTIFICATION TAGS FOR EQUIPMENT AND INSTRUMENTS

A. All process equipment, pumps, blowers, valves, gates and process instruments that are identified by a tag number on the Process and Instrumentation Diagrams (P&IDs on Instrumentation contract drawings) shall have an identification tag at the device.

B. The identification tag shall show a unique tag number for the device and the common name of the device as referred to on the Drawings.

C. The identification tag shall be non-corrosive metal tags, ASTM A240 Grade 430 stainless steel with a bright annealed finish.

D. Characters on identification tags shall be 3/16” high and surface cut deep unless otherwise noted. Characters shall be cut into stainless steel tags with a diamond tip cutter.

E. Identification tags shall be buffed around the perimeter to remove any sharp edges or corners.

F. Identification tags shall be attached to the equipment item, valve, or instrument with 0.9 mm diameter wire or stainless steel screws.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -

SECTION 01660

EQUIPMENT TESTING, TRAINING, AND STARTUP

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Equipment testing and startup are requisite to satisfactory completion of the contract and, therefore, shall be completed within the time specified for substantial completion.

B. The Contractor shall allow sufficient time in his construction schedule to complete equipment testing, trouble shooting, corrections, and startup prior to substantial completion for any given portion of the Work and in accordance with the approved construction schedule.

C. As construction of the project proceeds through the final stages of completion associated with each construction phase, the Contractor shall, in accordance with the requirements set forth in the Contract Documents, attend to the following items for the equipment and facilities scheduled to be placed into service:

1. Schedule equipment manufacturer's visits to site.

2. Calibrate instruments, controls and controlled equipment.

3. Perform required testing, adjusting, and balancing of project components as specified for individual systems, equipment, and processes.

4. Schedule start-up and initial operation.

5. Furnish skilled personnel during initiation operation.

6. Perform Owner operation and maintenance training.

7. Conduct performance testing on equipment when specified.

8. Perform final acceptance testing for whole systems in order to place in service

D. Refer to other Divisions for further requirements regarding, scheduling, startup and testing. Portions of the Work will require separate start up periods in order to place parts of the Work in service before other Work can begin. All portions of the Work, whether or not started prior to project substantial completion, shall follow the steps specified herein.

1.02 EQUIPMENT TESTING

A. The Contractor shall provide the services of an experienced and authorized representative of the supplier of each item of equipment (excluding minor items of equipment specifically exempted by the Owner in writing), who shall visit the site of the Work and inspect, check, adjust if necessary, and approve the equipment installation prior to startup. In each case,

the Contractor shall arrange to have the supplier's representative revisit the job site as often as necessary until any and all trouble is corrected and the equipment installation and operation are satisfactory to the Owner.

B. The Contractor shall require that each supplier's representative test their equipment and furnish to the Owner a written report addressed to the Owner, certifying that the equipment has been properly installed and lubricated, is in accurate alignment, is free from any undue stress imposed by connecting piping or anchor bolts, and has been tested, operated satisfactorily under full-load conditions, is ready for final performance testing (if specified) or otherwise placed in operation, and the Owner's operating personnel have been instructed in the operation, maintenance and lubrication of the equipment.

C. The Contractor shall be responsible for scheduling all operations testing. The Contractor is advised that the Owner and the Owner's operating personnel will witness operations testing.

D. The Contractor shall furnish all personnel, chemicals, fuel, oil, grease, and all other necessary equipment, facilities, and services required for conducting tests until the Owner has accepted the system that is associated with the equipment and has taken over operation of the system.

1.03 START-UP SERVICES

A. Equipment start-up shall begin after satisfactory completion and acceptance of the equipment tests and coincidentally with the completion date for the part of the Work for which the equipment is included in accordance with the construction schedule..

B. During the equipment start-up period and in accordance with the sequence of construction and schedule, the Contractor shall furnish, at no additional cost to the Owner the services of factory trained representatives of the equipment manufacturers for the equipment designated in the Specifications to:

1. Assist in the start-up and operations of the equipment.

2. Assist in the training of plant personnel, designated by the Owner in the proper operation and maintenance of the equipment.

C. Contractor shall be available to promptly repair all work during the equipment startup so as to cause minimum disruption to the plant operation.

1.04 START-UP PROCEDURES

A. The Contractor shall be responsible for the complete test, check out, start-up and commissioning of all elements of the project. The Contractor shall verify these activities through daily inspection reports, test records, on-site vendor certifications and by other appropriate means. The test and start-up requirements below are complementary to those specified elsewhere in the Contract Documents.

1. Component test and check out is the verification that each component of the Work is in compliance with the Contract Documents, and is ready to perform its intended

function.

2. Sub-system test and start-up is the verification that a discrete group of related components is functioning as intended within itself and is ready to perform its intended function in the overall system.

3. System test and start-up is the operation and verification that all related components and sub-systems are functioning as intended and are ready for final commissioning and operation.

4. Commissioning is .placing a complete system or project into service.

B. The Contractor shall conduct all test, check out and start-up requirements specified in the Contract Documents and provide documentation of same to the Owner prior to commissioning. Where vendor on-site inspections are required prior to or during start-up, the Contractor shall require vendor to provide a written statement that the installation and check out is complete and proper and that the item(s) are ready for start-up and/or commissioning.

1.05 SYSTEM STARTUPS

A. The startup of a different plant processes is a highly complex operation requiring the combined technical expertise of the Contractor, suppliers, subcontractors, and the Owner. The Contractor shall provide the effective coordination of all parties necessary for the successful startup during each phase of the sequence of work.

B. It is not the intent of the Owner to instruct the Contractor in the startup of equipment for any new systems. However, the Owner will be available prior to and during startup to provide technical support to the Contractor.

C. Startup of completed work shall not commence until all required leakage tests, electrical system tests, instrumentation system tests, and equipment tests have been completed to the satisfaction of the Owner.

D. Any special performance tests associated with a particular subsystem or piece of equipment as specified in the individual specification sections for those subsystems or equipment, shall be conducted as part of the system startup for which the subsystems or equipment are associated.

E. The control system startup shall be coordinated with system startup activities and shall be extended as required until all plant processes are fully operational and to satisfy the Owner that all control system contract requirements have been fulfilled in accordance with the Contract Documents. Refer to Division 17 for additional requirements.

F. All defects in materials or workmanship which appear during this test period shall be immediately corrected by the Contractor. Time lost for equipment repairs, wiring corrections, control point settings, or other reasons which actually interrupt the startup may, at the discretion of the Owner, be justifiable cause for extending the startup test duration.

G. During the startup, the Contractor shall provide the services of authorized representatives of the suppliers, in addition to those services required under operations testing, as necessary, to correct faulty equipment operation.

H. For any system being started up, the system shall have been in operation for a minimum of seven (7) consecutive and continuous days of satisfactory operation. If the system or individual equipment in a system malfunctions during the 7-day start-up period, the start-up period will be restart until satisfactory operation is achieved for 7 consecutive days.

I. For systems successfully started up and accepted by the Owner ahead of the project substantial completion in order for other portions of the Work to be started, such systems shall be deemed to be in beneficial use. The warrantees for all associated equipment of such systems shall start on the date agreed to by the Owner for the date of beneficial use for such systems. In the event a system, equipment or component proves defective or is unable to maintain specified performance criteria after a system is in beneficial use up to the date of substantial completion for the project, the Contractor shall replace the defective item and the warranty period called for in the Contract Documents for the item shall re-start after satisfactory replacement and testing of the item.

J. The Contractor's general warranty period shall not begin until the date of Final Completion. For the last systems placed in service in accordance with the approved construction schedule shall have all associated warranties start on the date of Substantial Completion.

1.06 TRAINING AND INSTRUCTION

A. The supplier's representative shall instruct the Owner's operating personnel in correct operation and maintenance procedures. The instruction shall demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment. Such instruction shall be scheduled in accordance with the sequence of each phase of the work at times arranged with the Owner at least 2 weeks in advance and shall be provided while the respective representative's equipment is fully operational. On-site instruction shall be given by qualified persons who have been made familiar in advance with the equipment and systems in the plant. Training shall not commence until O&M Manuals have been accepted by the Owner and are available on site for use during training.

B. The Contractor shall notify and distribute training session agenda and training material to the Owner at least 14 days in advance of each equipment test or Owner training session.

C. Training shall be provided to two (2) separate shifts of the Owner's personnel between the hours of 8:00 A.M. to 10:00 A.M. and 3:00 P.M. to 5:00 P.M. with separate training sessions for maintenance and operations as necessary, week days, excluding holidays.

D. Provide professional video recording of all training sessions. Completed, labeled DVDs shall be provided to the Owner for each type of training session. Video recordings shall be done by qualified professionals.

PART 2 – PRODUCTS

(Not Used)

PART 3 – EXECUTION

(Not Used)

- END OF SECTION -

SECTION 01700

PROJECT CLOSEOUT

PART 1 -- GENERAL

1.01 SUBSTANTIAL COMPLETION

A. Substantial Completion is defined as that point when all portions of the Work have been successfully started up and accepted by the Owner and all final grading, paving, painting, grassing, and all other ancillary project requirements have been completed such that any remaining work can be completed within one (1) month.

B. When the Contractor believes Substantial Completion has been achieved, Contractor shall request, in writing, to the Engineer, that Substantial Completion be recognized as having been achieved and request that the Owner issue a Certificate of Substantial Completion. Prior to making such a request, the Contractor must have:

1. Completed all work necessary for the safe, proper and complete use or operation of the facility as intended.

2. Submitted for and received acceptance of accurate record drawings for all work completed to date.

3. Submitted and received acceptance of all specified warranties, guarantees and operation and maintenance manuals.

4. Completed all required vendor training, testing, and start-up.

5. Delivered all required spare parts and O&M Manuals.

C. Upon receipt of the request from the Contractor, the Engineer and designated representatives shall review the request, the Work and the above requirements to determine whether the Contractor has achieved Substantial Completion. If this review fails to support Substantial Completion, the Engineer shall so notify the Contractor in writing citing the reasons for rejection. If the Engineer determines the Contractor has reached Substantial Completion, the following procedures will be followed:

1. The Engineer and Owner will review the Contractor's punch list to assure all deficiencies are noted and add to the list any noted deficiencies or incomplete work found during a pre-final walk-through of the Work. The Final Punch List will be provided to the Contractor with all items listed that must be completed to achieve Final Completion.

2. Along with the Final Punch List, the Engineer shall prepare a Certificate of Substantial Completion establishing the date for Substantial Completion as the date of the pre-final walk-through, assuming the walk-through has verified that the Project is in fact substantially complete.

1.02 FINAL COMPLETION

A. Final Completion will be deemed to have occurred when all work is complete including the following:

1. All Final Punch List items have been corrected, signed off by the Contractor and the Engineer, and demonstrated to the Owner during a final walk through.

2. All updates to the record drawings, and operations and maintenance manuals have been made.

3. Demobilization and site clean-up are complete.

4. The Engineer has issued a Certificate of Final Completion.

5. Touch up marks or defects in painted surfaces and touch up any similar defects in factory finished surfaces, regardless if so noted on the Final Punch List.

6. Remove bitumen from gravel stops, fascias, and other exposed surfaces, regardless if so noted on the Final Punch List.

7. Remove all stains, marks, fingerprints, soil, spots, and blemishes from all finished surfaces, tile, stone, brick, and similar surfaces, regardless if so noted on the Final Punch List.

8. The following documents have been turned over to the Owner:

a. Outstanding test results, certificates, and performance documents of project components that have not yet been received. The Contractor's attention is directed to the fact that such documents must actually be submitted earlier in accordance with the sequence of construction and at the time of startup for any portion of the Work.

b. Any updates for the record drawings and/or O&M Materials found after startup of any portion of the Work.

c. Contractor’s written warranty statement as specified herein.

1.03 CLOSE OUT REQUIREMENTS

A. Final Cleaning

1. At the completion of each phase of the work and prior to startup, as scheduled the Contractor shall remove all rubbish from and about the site of the completed work, and all temporary structures, construction signs, tools, scaffolding, materials, supplies and equipment which he or any of his Subcontractors may have used in the performance of the work. Contractor shall broom clean paved surfaces and rake clean other surfaces of grounds.

2. Contractor shall thoroughly clean all materials, equipment and structures; all marred surfaces shall be touched up to match adjacent surfaces; dirty filters and burned out lights replaced as required; all glass surfaces cleaned and floors cleaned and polished so as to leave work in a clean and new appearing condition.

3. Contractor shall maintain cleaning until project, or portion thereof, is occupied by the Owner.

B. Spare Parts and Special Tools

1. As soon as practicable after approval of the list of equipment, the Contractor shall furnish spare parts data for each different item of equipment listed. The data shall include a complete list of parts and supplies, with current unit prices and source or sources of supply.

2. Prior to equipment startup, Contractor shall also furnish a list of parts, and supplies that are either normally furnished at no extra cost with the purchase of the equipment or specified to be furnished as part of the Contract and a list of additional items recommended by the manufacturer to assure efficient operation for a period of one-hundred and twenty (120) days for the particular installation.

3. All parts shall be securely boxed and tagged, and clearly marked on the box and individually for identification as to the name of manufacturer or supplier, applicable equipment, part number, description and location in the equipment. All parts shall be protected and packaged for a shelf life of at least ten (10) years.

4. Contractor shall furnish at no additional cost to the Owner with each piece of equipment as a minimum, one (1) complete set, or the number of sets called for in the Technical Specifications, of suitably marked special tools and appliances which may be needed to adjust, operate, maintain, or repair the equipment prior to equipment startup.

5. Contractor shall submit, for approval by the Owner, a complete list of the special tools and appliances to be furnished. Such tools and appliances shall be furnished in approved painted steel cases properly labeled and equipped with good grade cylinder locks and duplicate keys prior to equipment startup.

C. Final Cleanup; Site Rehabilitation

1. Before final acceptance, the Contractor shall wash and clean all exposed surfaces which have become soiled or marked, and shall remove from the site of work all accumulated debris and surplus materials of any kind which result from his operation, including construction equipment, tools, sheds, sanitary enclosures, etc. The Contractor shall leave all equipment, fixtures, and work, which he has installed, in a clean condition. The completed project shall be turned over to the Owner in a neat and orderly condition.

2. The site of the work shall be rehabilitated or developed in accordance with other sections of the Specifications and the Drawings. In the absence of any portion of these requirements, the Contractor shall completely rehabilitate the site to a

condition and appearance equal or superior to that which existed just prior to construction, except for those items whose permanent removal or relocation was required in the Contract Documents or ordered by the Owner.

D. Contractor's Warranty: The Contractor shall warrant the Work under this Contract, regardless of whether supplied by a vendor or subcontractor, that the Work is free of defects in workmanship and materials and that the Work meets the requirements of the Contract Documents. The Contractor's warranty period shall begin at the date of Final Completion and shall be for a period of two (2) years. During this period, the Contractor shall repair or replace items found either to be defective or deficient in meeting the requirements of the Contract Documents. The Contractor's warranty shall be a written warranty submitted with the final pay application and shall be in addition to the product, materials, systems, and equipment guarantees and warranties called for with the various sections of the specifications.

PART 2 – PRODUCTS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

- END OF SECTION -

SECTION 01720

PROJECT RECORD DRAWINGS

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall keep and maintain, at the job site, one record copy of all drawings, specifications, addenda, change orders, and other modifications to the Contract, approved shop drawings, and field test records.

B. The Contractor shall mark the drawings to indicate all project conditions, locations, configurations, and any other changes or deviations which may vary from the details represented on the original Contract Drawings, including buried or concealed construction and existing utility features which are revealed during the course of construction. Special attention shall be given to recording the horizontal and vertical location of all new and existing buried utilities that differ from the locations indicated, or which were not indicated on the Contract Drawings. Said record drawing markups shall be supplemented by any detailed sketches as necessary or directed to indicate, fully, the Work as actually constructed and those existing features encountered during construction of new work. These master record drawing markups of the Contractor's representation of as-built conditions, including all revisions made necessary by addenda and change orders, shall be maintained up-to-date during the progress of the Work.

C. Project record drawing markups shall be maintained and updated by the Contractor on a weekly basis.

D. Record drawing markups shall be accessible to the Owner and Engineer at all times during the construction period.

E. Periodic payments shall not be processed prior to Engineer's review and acceptance of record drawing markups development for the pay period submitted.

F. Final payment will not be acted upon until the Contractor has prepared and delivered record drawing markups to the Engineer. Said up-to-date record drawing markups shall be in the form of a set of prints 24 x 36 inch in size with carefully plotted information overlaid in red ink.

G. Upon substantial completion of the Work and prior to final acceptance, the Contractor shall finalize and deliver a complete set of record drawing markups to the Engineer conforming to the construction records of the Contractor. This set of drawings shall consist of corrected drawings showing the reported location of the Work. The information submitted by the Contractor and incorporated by the Engineer into the Record Drawings will be assumed to be correct, and the Contractor shall be responsible for the accuracy of such information, and shall bear the costs resulting from the correction of incorrect data furnished to the Owner.

1.02 RECORDING

A. Label each document "PROJECT RECORD" in neat large printed letters.

B. Record information concurrently with the progress of construction as specified under Section 01541, Field Surveying.

C. For any Work that required development of electronic drawing files as part of the original submittal on that work, provide one (1) electronic file copy of all such drawings in the current version of AutoCAD, (coordinate with Engineer and Owner for preferred version) (wiring diagrams, piping layouts, system diagrams, etc.)

D. Legibly mark drawings to record actual construction

1. Incorporate changes made by Field Order, Change Order, or Construction Change Directive.

2. Incorporate details generated during the construction phase not shown on the original Contract Drawings.

1.03 SUBMITTAL

A. Prior to Final Completion, submit Record Documents to the Engineer.

B. Accompany submittal with a transmittal letter in duplicate, containing:

1. Date.

2. Project title and number.

3. Contractor's name and address.

4. Title and number of each record document.

5. Signature of Contractor or its authorized representative.

PART 2 – PRODUCTS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

- END OF SECTION -

SECTION 01730

OPERATION AND MAINTENANCE MANUALS

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Contractor shall provide operation and maintenance materials as specified herein and as further specified in individual sections of the Contract Document specifications. Format and content of these materials shall be as specified herein.

1.02 SUBMITTALS

A. Written operations and maintenance instructions are required for all equipment items supplied for this project. The amount of detail shall be commensurate with the complexity of the equipment item. Pictorial cuts of equipment are required for operator reference in servicing.

B. Submit the following for each individual piece of equipment, system, materials, or products:

1. Preliminary Operation and Maintenance Manuals: The Contractor shall submit two (2) complete hard copies of preliminary Operations and Maintenance (O&M) Manuals for each item of equipment at the same time the equipment is delivered to the project site (one set to be given to the Engineer, the other kept in the Contractor's field office). Submit a searchable, electronic copy of all such materials in PDF format to the Engineer for review.

2. Final Operation and Maintenance Manuals: Furnish to the Owner three (3) complete hard copies and one (1) electronic copy in searchable PDF format of a fully assembled Operation and Maintenance Manual Volumes after incorporating all Owner's and Engineer's review comments on the preliminary Operation and Maintenance Manual.

3. The Equipment Data Summary (see attached example) shall be completed IN FULL for each equipment item furnished by the Contractor. Completed Equipment Information Summary forms shall be assembled within a separate section so dedicated within the Operation and Maintenance Manual. An electronic copy of each completed Equipment Data Summary shall be provided as a separate worksheet within a Microsoft Excel workbook file (.xls) on a CD-ROM. Worksheet tabs shall be labeled with the associated equipment item's Equipment Tag.

1.03 FORMAT AND CONTENTS

A. Each Operations and Maintenance Manual shall contain the following information:

1. Storage instructions and requirements (short term and long term)

2. Installation instructions

3. Assembly and erection drawings/details

4. Dimensional drawings

5. Wiring diagrams including all control and lightning systems

6. Equipment data summary table (see sample form at the end of this section)

7. Equipment preventative maintenance data summary (see sample form at the end of this section)

8. Manufacturer's operating manual/instructions including equipment start-up, normal operation, shutdown, and emergency operation

9. Manufacturer's maintenance instructions including equipment calibration and adjustment, preventive and repair maintenance, and lubrication instructions

10. Trouble shooting guide

11. Parts diagram/list

12. Spare parts list (these are parts that the manufacturer recommends having readily available for use during preventative maintenance or are normal wear items)

13. Recommended lubricant types (lubrication schedule shall be included with the preventative maintenance data summary)

14. Tools list (any tools that will be required for preventative maintenance, disassembly, or re-assembly of the equipment)

15. Single line schematic

16. List of electrical relay settings and control and alarm contact settings.

17. Applicable software (if required)

18. Software manuals (if required)

19. Warranty

20. Contact information for the contractor, manufacturer, manufacturer's representative and nearest service representative

21. Any additional information not covered above that was included in the approved submittal for each item with all comments corrected and addressed.

B. Any equipment that contains multiple components (for example a pump and motor), the above information shall be provided for each component.

C. For valve operation and maintenance manuals, provide one valve schedule giving valve number, location, fluid, and fluid destination for each valve installed. Group all valves in same piping systems together in the schedule. Obtain a sample of the valve numbering system from the Owner.

D. All operation and maintenance manual material shall be printed on 8-1/2”x11” or 11”x17” paper.

E. Each manual shall be bound together in appropriate three-ring binders. Each binder shall be provided with front cover with the following information, as a minimum:

1. City of Venice logo
2. Project name
3. Date (Month / Year)
4. Equipment name(s)
5. Applicable specification section
6. Manufacturer’s name
7. Contractor’s name

F. Each manual shall also be provided with a binder edge cover that contains, at a minimum, the project name, date and equipment name. If multiple items of equipment or materials are included in a binder, provide the names of each product included in the binder edge cover and on the front cover.

G. Each manual shall be divided into sufficient sections to facilitate ease of use and reference of the manual. Sections shall be identified using heavy section dividers with reinforced holes and numbered plastic index tabs; tabs with section titles shall be acceptable. A detailed table of contents shall be provided. At a minimum, the following sections shall be provided:

1. Equipment technical data summary
2. Storage / installation instructions
3. Operation instructions
4. Maintenance instructions
5. Dimensional/assembly drawings, diagrams, and parts lists
6. Wiring drawings and diagrams
7. Contact information

8. Warranty

H. All operating and maintenance material that comes bound by the equipment manufacturer shall be left in its original bound state. Cross-reference the appropriate sections of the Contractor's operations and maintenance manual to the manufacturers' bound manuals.

I. Label binders Volume 1, 2, and so on, where more than one binder is required. Include the table of contents for the entire set, identified by volume number, in each binder.

J. When manufacturer's manuals and diagrams contain information applicable to multiple models or configurations, the information not applicable to this specific installation shall be stricken.

K. The final operations and maintenance manual shall reflect the most current edition of the shop drawing accepted by the Engineer. Any field changes or modifications shall also be included.

PART 2 – PRODUCTS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

Equipment Data Summary		
ID	**Item**	**Information**
1	CMMS Equipment ID: (filled in by CMMS processor)	
2	Equipment Name (As Stated on Drawings)	
3	Equipment Tag (To Be Furnished on Drawings)	
4	Location Installed (brief Description of location)	
5	Model Number	
6	Serial Number	
7	Purchase Date	
8	Installed Date	
9	Manufacture Date (Factory created date)	
10	Contact Name for future questions	
11	Contact Name Number	
12	Purchase Order # to 1st level Vendor	
13	Purchase Order # to 2nd level Vendor	
14	Purchase Order # to 3rd level Vendor	
15	Date Placed In Service (Turned over to operations)	
16	Size (estimated if needed)	
17	Additional notes	
18	Parent (next upper level attachment)	
19	Manuals received by -> (who manuals issued to)	
20	Warranty Period (Days)	
21	Life Expectancy (Months)	
22	Expected Date of Replacement / Rebuild	
23	Capacity / Units (if applicable)	
24	Motor Type (if applicable)	
25	Motor Size / HP (if applicable)	
26	Drive Type (if applicable)	
27	Lubrication Type	
28	Current Replacement Cost (required, estimate if needed)	
29	Current Rebuild Cost	
30	Preventive Maintenance Forms issued to ->	
31	Manufacturer Name	
32	Manufacturer Contact	
33	Manufacturer Address	
34	Manufacturer City	
35	Manufacturer State	
36	Manufacturer Zip	
37	Manufacturer Country	
38	Manufacturer Phone	
39	Manufacturer Fax	
40	Manufacturer Pager	

Equipment Data Summary		
ID	**Item**	**Information**
41	Vendor Name	
42	Vendor Address	
43	Vendor City	
44	Vendor State	
45	Vendor Zip	
46	Vendor Country	
47	Vendor Phone	
48	Vendor Fax	
49	Vendor Pager	
50	PM Rpl. Part 1 Interval (Days)	
51	PM Rpl. Part 1 Units of Measure	
52	PM Rpl. Part 1 Purchase Price	
53	PM Rpl. Part 1 Target Inventory	
54	PM Rpl. Part 1 Units Per Package	
55	PM Rpl. Part 1 Minimum Order	
56	PM Rpl. Part 1 Purchase Units of Measure	
57	Preventive Maintenance (PM) Rpl. Part 2	
58	PM Rpl. Part 2 Interval (Days)	
59	PM Rpl. Part 2 Units of Measure	
60	PM Rpl. Part 2 Purchase Price	
61	PM Rpl. Part 2 Target Inventory	
62	PM Rpl. Part 2 Units Per Package	
63	PM Rpl. Part 2 Minimum Order	
64	PM Rpl. Part 2 Purchase Units of Measure	
65	Preventive Maintenance (PM) Rpl. Part 3	
66	PM Rpl. Part 3 Interval (Days)	
67	PM Rpl. Part 3 Units of Measure	
68	PM Rpl. Part 3 Purchase Price	
69	PM Rpl. Part 3 Target Inventory	
70	PM Rpl. Part 3 Units Per Package	
71	PM Rpl. Part 3 Minimum Order	
72	PM Rpl. Part 3 Purchase Units of Measure	

Preventive Maintenance Summary

CMMS Equipment ID::			
Equipment Name:			
Manufacturer:			
Model No:		Serial No:	
Maintenance Task	Lubricant/Part	D W M Q SA A	O&M Manual Reference
NOTES:			

*D-Daily W-Weekly M-Monthly Q-Quarterly SA-Semi-Annual A-Annual

- END OF SECTION -

SECTION 02222

EXCAVATION AND BACKFILL FOR UTILITIES

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Excavate, grade and backfill as required for the site underground piping systems, as shown on the Drawings and specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01300 – Submittals

B. Section 15000 – Piping, General

1.03 SUBMITTALS

A. The Contractor shall submit information and samples to the Engineer for review as specified herein in accordance with the Section 01300 entitled "Submittals".

B. Dewatering

1. The Contractor shall submit to the Engineer his proposed methods of handling trench water and the locations at which the water will be disposed of. Methods shall be acceptable to the Engineer before starting the excavation. The Contractor shall pay for and procure all necessary permits for dewatering.

C. Bedding and Backfill Materials

1. The Contractor shall notify the Engineer of the off-site sources of bedding and backfill materials, and provide a sample of the material, available to the Owner and the Engineer, at the construction site.

1.04 QUALITY CONTROL

A. All soils testing shall be performed by an independent testing laboratory retained by the Contractor. The Contractor shall schedule his Work so as to permit a reasonable time for testing before placing succeeding lifts of backfill and shall keep the laboratory informed of his progress. In the event any test shows the work is not in conformance with these Contract Documents, the cost of any subsequent testing to show conformance shall be borne by the Contractor. All test results shall be sent directly to the Engineer.

1.05 GROUNDWATER

A. The Contractor shall be responsible for anticipating groundwater conditions and shall provide positive control measures as required. Such measures shall ensure stability of excavations, groundwater pressure control, prevention of tanks, pipes, and other

structures from being lifted by hydrostatic pressures, and avoiding the disturbance of subgrade bearing materials.

1.06 TRENCH SAFETY ACT COMPLIANCE

A. The Contractor by signing and executing the contract is, in writing, assuring that he will perform any trench excavation in accordance with the Florida Trench Safety Act, Section 553.60 et. seq. The Contractor further identified the separate item(s) of cost of compliance with the applicable trench safety standards as well as the method of compliance as noted in the Contract front-end document.

B. The Contractor acknowledges that this cost is included in the applicable items of the Proposal and Contract and in the Grand Total Bid and Contract Price.

C. The Contractor is solely responsible to review or assess the Contractor's safety precautions, programs or costs, or the means, methods, techniques or technique adequacy, reasonableness of cost, sequences or procedures of any safety precaution, program or cost, including but not limited to, compliance with any and all requirements of Florida Statute Section 553.60 et. seq. cited as the "Trench Safety Act". The Contractor is solely responsible to determine if any safety or safety related standards apply to the project, including but not limited to, the "Trench Safety Act".

1.07 PROTECTION OF PROPERTY AND STRUCTURES

A. The Contractor shall, at his own expense, sustain in place and protect from direct or indirect injury, all pipes, poles, conduits, walls, buildings, and all other structures, utilities, and property in the vicinity of his work. Such sustaining shall be done by the Contractor. The Contractor shall take all risks attending the presence or proximity of pipes, poles, conduits, walls, buildings, and all other structures, utilities, and property in the vicinity of his work. He shall be responsible for all damage, and assume all expenses, for direct or indirect injury and damage, caused by his work, to any such pipe, structures, etc., or to any person or property, by reason of injury to them, whether or not such structures, etc., are shown on the Drawings.

B. Barriers shall be placed at each end of all excavations and at such places as may be necessary along excavations to warn all pedestrian and vehicular traffic of such excavations. Barricades with flashing lights shall also be placed along excavation from sunset each day to sunrise of the next day until such excavation is entirely refilled, compacted, and paved. All excavations shall be barricaded where required to meet OSHA, local and Federal Code requirements, in such a manner to prevent persons from falling or walking into any excavation within treatment plant fenced property.

1.08 SITE CONDITIONS

A. General

1. The Owner and/or the Engineer will not assume responsibility for variations of sub-soil quality or conditions. The Contractor shall examine the site and review available geotechnical reports from previous projects or undertake its own

subsurface investigation prior to submitting its bid, taking into consideration all conditions that may affect its work.

PART 2 -- PRODUCTS

2.01 MATERIALS

A. Materials shall be furnished as required from on-site excavations or from acceptable off-site sources as required. The Contractor shall notify the Engineer of the sources of each material at least ten calendar days prior to the anticipated use of the materials.

B. Sand shall be used as bedding for all polyvinyl chloride or high density polyethylene or other plastic pipe placed in dry trench conditions. Sand shall be dry graded sand with 100 percent passing a 3/8-inch sieve and not more than 5 percent passing a No. 200 sieve.

C. Screened gravel shall be used as bedding for small diameter pipe (less than 24 inches in diameter) in all cases and plastic pipe bedding when either the trench is within the water table or when the bedding is sided by muck or muck-like material. Screened gravel shall consist of hard, durable particles of proper size and graduation, and shall be free from organic material, wood, trash, sand, loam, clay, excess fines, and other deleterious materials. The gravel shall be graded within the following limits:

Sieve Size	**Percent Finer by Weight**
1 inch	100
3/4 inch	99
1/2 inch	65
No. 4	2

D. Crushed stone shall be used for bedding of 24-inch and larger diameter pipe as detailed and at other locations indicated on the Drawings. Crushed stone shall consist of hard, durable, subangular particles of proper size and graduation, and clay, excess fines, and other deleterious materials. The stone shall be graded within the following limits:

Sieve Size	**Percent Finer by Weight**
5/8 inch	100
1/2 inch	40 - 100
3/8 inch	15 - 45
No. 10	0 -5

E. Trench backfill shall be clean sandy excavated material, that is free from organics clay and construction debris and can be used for backfill material. All material to be used as trench backfill shall be able to pass a 3/4-inch sieve. If, in the Engineer's opinion, excavation material is unsuitable for backfill purposes, imported material having a sand equivalent value of not less than 20 percent shall be used for this portion of the trench backfill. All backfill material (placed above select backfill) shall be able to pass through a

6-inch ring. If suitable backfill is not available from the excavations, it shall be obtained from off site sources.

PART 3 -- EXECUTION

3.01 EXCAVATION

A. The Contractor shall perform all excavation of every description and of whatever substance encountered, to the dimensions, grades and depths shown on the Drawings, or as directed. All excavations shall be made by open cut. All existing utilities such as pipes, poles and structures shall be carefully located, supported and protected from injury; in case of damage, they shall be restored at the Contractor's expense.

B. Pipe trenches for piping shall be excavated to a width within the limits of the top of the pipe and the trench bottom so as to provide a clearance on each side of the pipe barrel, measured to the face of the excavation, or sheeting if used, of 8 inches to 12 inches. Where the pipe size exceeds 12 inches, the clearance shall be from 12 inches to 18 inches. All pipe trenches shall be excavated to a level where suitable material is reached, a minimum of 8 inches below the excavated depth that will allow for a minimum of 36 inches of covering unless otherwise indicated on the Drawings. Excavation depths in other types of materials and conditions shall be made as hereinafter specified.

C. Ladders or steps shall be provided for and used by workmen to enter and leave trenches.

D. Excavation for appurtenances shall be sufficient to provide a clearance between their outer surfaces and the face of the excavation or sheeting, if used, of not less than 12 inches.

E. Excavated unsuitable material shall be removed from the site and disposed of by the Contractor. Materials removed from the trenches shall be stored and in such a manner that will not interfere unduly with plant operations, traffic on public roadways and sidewalks and shall not be placed on private property. In congested areas, such materials as cannot be stored adjacent to the trench or used immediately as backfill shall be removed to other convenient places of storage acceptable to the OWNER at the Contractor's expense.

F. Excavated material that is suitable for use as backfill shall be used in areas where sufficient material is not available from the excavation. All excess excavated suitable material shall be the property of the OWNER and shall be delivered to a designated location within a seven mile one way travel distance from the site.

3.02 SHEETING AND BRACING

A. The Contractor shall furnish, place and maintain sheeting and bracing to support sides of the excavation as necessary to provide safe working conditions in accordance with OSHA requirements, and to protect pipes, structures and other Work from possible damage. Where wood sheeting or certain designs of steel sheeting are used, the sheeting shall be cut off at a level of 2 feet above the top of the installed pipe and that portion below the level shall be left in place. If interlocking steel sheeting is used, it may be removed providing removal can be accomplished without disturbing the bedding, pipe or alignment

of the pipe. Any damage to the pipe bedding, pipe or alignment of the constructed utility caused by the removal of sheeting shall be cause for rejection of the affected portion of the work. The OWNER may permit sheeting to be left in place at the request and expense of the Contractor.

B. If the Engineer is of the opinion that at any point sufficient or proper supports have not been provided, he may order additional supports put in at the Contractor's expense. The Contractor shall be responsible for the adequacy of all sheeting used and for all damage resulting from sheeting and bracing failure or from placing, maintaining and removing it.

3.03 REMOVAL OF WATER

A. It is a basic requirement of these Specifications that excavations shall be free from water before pipe or structures are installed.

B. The Contractor shall provide pumps, and other appurtenant equipment necessary to remove and maintain water at such a level as to permit construction in a dry condition. The Contractor shall continue dewatering operations until backfilling has progressed to a sufficient depth over the pipe to prevent flotation or movement of the pipe in the trench or so that it is above the water table. If at any point during the dewatering operation it is determined that fine material is being removed from the excavation sidewalls, the dewatering operation shall be stopped if acceptable to the Engineer. If any of the subgrade or underlying material is disturbed by movement of groundwater, surface water, or any other reason, it shall be replaced at the Contractor's expense with crushed stone or gravel.

C. The Contractor shall use dewatering systems that include automatic starting devices, and standby pumps that will ensure continuous dewatering in the event of an outage of one or more pumps.

D. Water from the trenches and excavation shall be disposed of in such a manner as will not cause injury to public health, to public or private property, to the Work completed or in progress, to the surface of the streets, cause any interference with the use of the same by the public, or cause pollution of any waterway or stream. The Contractor shall submit his proposed methods of handling trench water and locations at which the water will be disposed of to the Engineer for review and shall receive acceptance before starting the excavation. Disposal to any surface water body will require silt screens to prevent any degration in the water body.

3.04 TRENCH STABILIZATION

A. No claim for extras or additional payment will be considered for cost incurred in the stabilization of trench bottoms which are rendered soft or unstable as a result of construction methods, such as improper or inadequate sheeting, dewatering or other causes. In no event shall pipe be installed when such conditions exist and the Contractor shall correct such conditions so as to provide proper bedding or foundations for the proposed installation at no additional cost to the OWNER before placing the pipe or structures.

3.05 PIPE BEDDING

A. Pipe trenches shall be excavated as described in Article 3.01 of this Section. The resulting excavation shall be backfilled with acceptable pipe bedding material, up to the level of the centerline of the proposed pipe barrel. This backfill shall be tamped and compacted to provide a proper bedding for the pipe and shall then be shaped to receive the pipe. Bedding shall be provided under the branch of all fittings to furnish adequate support and bearing under the fitting.

B. Any excavation below the levels required for installation of the pipe bedding shall be backfilled with acceptable bedding material, tamped, compacted and shaped to provide proper support for the proposed pipe, at the Contractor's expense.

3.06 BACKFILL

A. Pipelines

1. Pipeline trenches shall be backfilled to a level 12 inches above the top of the pipe with trench backfill material obtained from the excavation. Such material shall be placed in 6-inch layers, each compacted to the densities specified in Article 3.07 of this Section. Only hand operated mechanical compacting equipment shall be used within six inches of the installed pipe.

2. After the initial portion of backfill has been placed as specified above, and after all excess water has completely drained from the trench, backfilling of the remainder of the trench may proceed. The remainder of the backfill shall be trench backfill material obtained from the excavation and shall be placed in horizontal layers, the depth of which shall not exceed the ability of the compaction equipment employed, and in no event shall exceed a depth of 12 inches. Each layer shall be moistened, tamped, puddled, rolled or compacted to the densities specified in Article 3.07 of this Section.

3.07 COMPACTION AND DENSITIES

A. Compaction of backfill shall be 98 percent of the maximum density. More thorough compaction may be required when Work is performed in other regulatory agencies jurisdictions, such as the DOT. Methods of control and testing of backfill construction are:

1. Maximum density of the material in trenches shall be determined by ASTM D 1557.

2. Field density of the backfill material in place shall be determined by ASTM D 1556 or D 2922.

B. Trench Backfill

1. Field test density of each compacted lift of initial backfill in accordance with ASTM D2922 prior to placement of succeeding lifts.

2. Make a least one test per layer for each 40-foot length of trench.

3. If less than 300 feet of initial backfill is placed and compacted in a day, make one test per lift for each day's length.

C. Additional Field Density Tests

1. If test density of compacted backfill or fill is less than specified density, make additional tests at locations directed by Engineer.

2. Make additional field density tests at no additional cost to the OWNER.

D. Proctor

1. Make one Proctor Test in accordance with AASHTO T-99 for each source of fill. If material from excavation is used as backfill material, take a test proctor from the best available location as determined by the testing lab.

2. Upon completion of backfill, take an additional proctor from actual material used and compare to test proctor. If actual proctor varies from test proctor, retest backfill.

E. Laboratory: Retain a laboratory approved by Engineer to make field density tests and Proctor Tests as specified below:

1. Contractor shall pay the cost of initial density test(s).

2. Contractor shall pay costs for any additional testing required as a result of a failure of any initial test.

F. Trench backfill which does not comply with the specified densities, as indicated by such tests, shall be reworked and recompacted until the required compaction is secured, at no additional cost to the OWNER. The costs for retesting such Work shall be paid for by the Contractor.

3.08 ADDITIONAL EXCAVATION AND BACKFILL

A. Where organic material, such as roots, muck, or other vegetable matter, or other material which, in the opinion of the Engineer, will result in unsatisfactory foundation conditions, is encountered below the level of the proposed pipe bedding material, it shall be removed to a depth of two feet below the outside bottom of the pipe or to a greater depths as directed by the Engineer and removed from the site. Sheeting shall be installed if necessary to maintain pipe trenches within the limits identified by the Engineer. The resulting excavation shall be backfilled with suitable backfill material, placed in 12-inch layers, tamped and compacted up to the level of the bottom of the proposed pipe bedding material. Sufficient compaction of this material shall be performed to protect the proposed pipe against settlement. Construction shall then proceed in accordance with the provisions of Article 3.05 of this Section entitled "Pipe Bedding".

B. Additional excavation (more than two feet below the pipe) as indicated on the trench detail shall be performed only when ordered by the Engineer. Where organic or other material

is encountered in the excavation, the Contractor shall bring the condition to the attention of the Engineer and obtain his determination as to whether or not the material will require removal, prior to preparing the pipe bedding. The excavation of material up to a depth of two feet below the outside bottom incidental items of construction and the Work shall be done at the Contractor's expense.

3.09 ALTERNATE METHOD OF CONSTRUCTION

A. Use of This Method: A combination of conditions in the substrate, water table, or method of disposal may be encountered during the course of the work which makes dewatering impossible. When such conditions are encountered, but only after all reasonable means (pumps, well points, etc.) to dewater the excavation have been employed without success, the Contractor may request to employ the following Alternate Method of Construction. The concurrence of the Engineer shall be obtained in writing and shall limit the use of the alternate method of construction to such specific portions of the Work as the Engineer shall determine.

B. The requirements set forth in other sections of these Specifications shall establish the required standards of construction quality for this work. Use of the alternate method of construction described hereinafter shall in no way be construed as relieving the Contractor of the work. No additional payment will be made to the Contractor for excavation, backfill, sheeting or any cost incurred for Work or materials, or any other costs incurred as a result of the use of this alternate method of construction. The prices established in the Proposal shall be for full payment for the various items of work.

C. Subject to all the requirements stated herein, including written acceptance of the Engineer, construction will be permitted in accordance with the following specifications. All requirements of these Specifications shall apply to this construction unless otherwise specifically modified herein.

D. Removal of Water: The installation of pipe and appurtenances under water will be permitted and the requirements of Article 3.03 of this Section will be waived.

E. Excavation shall be performed in accordance with Article 3.01 of this Section to the specified limits. The excavation shall be completely cleaned of silt and other fines.

F. Pipe Bedding: Pipe bedding shall be placed from the bottom of the excavation to six inches above the top of the pipe. The bedding material shall be screened gravel or crushed stone as specified in Article 2.01 of this Section. Limerock screenings, sand or other fine organic material shall not be used.

G. The bedding material shall be placed to the lower third of the pipe barrel and then be shaped to receive the pipe at the intended elevation. Bedding shall be provided under the branch of all fittings to furnish adequate support and bearing under the fitting. After the pipe section is installed and tested if required, the remaining bedding shall be placed to the top of the pipe.

H. Select backfill material shall be used to backfill from 6 inches above the top of the pipe to a level one foot above standing ground water. The lift shall then be compacted per Article 3.07 of this Section. General backfill shall then be placed in 8-inch lifts and compacted per Article 3.07 of this Section.

I. If the Alternate Method of Construction is used, all backfill material, including specified pipe bedding material, shall be carefully lifted into the trench and not released to fall freely therein until the bucket or container is at or just above water level. Under no circumstances shall backfill material be dumped or pushed into the trenches containing water. Below water level, the bedding and backfill material shall be carefully rammed into place in uniform layers, of equal depth on each side of the pipe, up to one foot above the water level. Above the water level, backfill material shall be placed and compacted for normal backfill as previously specified.

- END OF SECTION -

SECTION 02276

TEMPORARY EROSION AND SEDIMENTATION CONTROL

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall design, provide, maintain and remove temporary erosion and sedimentation controls as necessary.

B. Temporary erosion controls may include, but are not limited to, mulching, netting, and watering, on site surfaces and spoil and borrow are surfaces and providing interceptor ditches at ends of berms and at those locations which will ensure that erosion during construction will be either eliminated or maintained within acceptable limits as established by the ENGINEER.

C. Temporary sedimentation controls include, but are not limited to, silt dams, traps, barriers and appurtenances at the foot of sloped surfaces which will ensure that sedimentation pollution will be either eliminated or maintained within acceptable limits as established by the ENGINEER.

D. Contractor shall provide effective temporary erosion and sediment control measures during construction or until final controls become effective.

1.02 SUBMITTALS

A. Submit schedule for temporary erosion and sedimentation control.

PART 2 -- PRODUCTS

2.01 EROSION CONTROL

A. Seeding and mulching, fertilization and watering shall be in accordance with Section 570-1 through 570-3 of the FDOT Specifications.

B. Netting: Fabricated of material acceptable to the Owner or Engineer.

2.02 SEDIMENTATION CONTROL

A. Bales: Clean, seed free cereal hay type.

B. Netting: Fabricated of material acceptable to the Owner or Engineer.

C. Filter Stone: Crushed stone conforming to FDOT Specifications.

PART 3 -- EXECUTION

3.01 EROSION CONTROL

A. Seeding shall be in accordance with Section 570-4 through 570-5 of the FDOT Specifications. The Contractor shall insure that all seeded areas have sustained growth prior to acceptance.

B. Mulching shall be in accordance with Section 570-4.6 of the FDOT Specifications.

C. Minimum procedures for mulching and netting are:

1. Apply mulch loosely to a thickness of between 0.75 inches and 1.5 inches.

2. Apply netting over mulched areas on sloped surfaces.

3.02 SEDIMENTATION CONTROL

A. Install and maintain silt dams, traps and barriers as shown on the approved schedule. Hay bales which deteriorate and filter stone which is lodged shall be replaced as required.

3.03 PERFORMANCE

A. Should any of the temporary erosion and sediment control measures employed by the Contractor fail to produce results which comply with the requirements of the ENGINEER, Contractor shall immediately take whatever steps are necessary to correct the deficiency at his own expense.

- END OF SECTION -

SECTION 02510

PAVING AND SURFACING

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish all labor, equipment and materials and perform all operations in connection with the construction of repair and reconstruction of existing asphalt concrete pavement as specified herein and as detailed on the Drawings.

B. All replacement of portions of the existing roads shall be to the limits, grades, thicknesses and types as shown on the Drawings. Patches for pipe crossings and areas damaged during the construction work shall be asphalt, unless otherwise indicated.

1.02 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. DOT Specifications: The phrase "DOT Specification" shall refer to the Florida Department of Transportation Standard Specifications for Road and Bridge Construction. The DOT Specifications, are referred to herein and are hereby made a part of this Contract to the extent of such references, and shall be as binding upon the Contract as though reproduced herein in their entirety. The Sections of the DOT Specifications which are referenced herein are as follows:

DOT 160	Stabilizing
DOT 200	Rock Base
DOT 230	Limerock Stabilized Base
DOT 300	Prime and Tack Coats for Base Courses
DOT 320	Hot Bituminous Mixtures - Plant Methods and Equipment
DOT 330	Hot Bituminous Mixtures - General Construction Requirements
DOT 331	Type S Asphaltic Concrete
DOT 346	Portland Cement Concrete
DOT 350	Cement Concrete Pavement
DOT 337	Asphaltic Concrete Friction Courses
DOT 902	Fine Aggregate
DOT 911	Limerock Material for Base and Stabilized Base
DOT 916	Bituminous Materials

1.03 SUBMITTALS

A. The Contractor shall submit his proposed formula for the asphaltic concrete paving for review in accordance with Section 01300 entitled "Submittals".

PART 2 -- PRODUCTS

2.01 MATERIALS

A. Base

1. The crushed concrete base shall consist of either one or two courses of crushed concrete in accordance with Section 204 and 911 of the DOT Specifications.

B. Subgrade

1. The materials and construction of the subgrade courses shall be per the drawings and DOT Specifications.

C. Asphaltic Concrete

1. The materials and construction of the asphaltic concrete patch and surface courses shall be per the drawings and DOT Specifications.

PART 3 -- EXECUTION

3.01 SUBGRADE

A. Roadway subgrades shall be stabilized to the minimum depth shown on the Drawings to a Limerock Bearing Ratio (LBR) of not less than 40. Stabilizing shall be Type B as defined in Section 160 of the DOT Specifications. Stabilization may require the addition and thorough mixing in of crushed limerock, course limerock screenings, or any other stabilizing material acceptable to the Engineer. The stabilizing material shall be applied in such quantity that, after mixing and blending, the subgrade will have a LBR of not less than 40. Stabilizing material shall be mixed or blended in the subgrade material by plowing, scarifying, disking, harrowing, blading, and mixing with rotary tillers until the mixed materials are of uniform bearing value throughout the width and depth of the layer being processed.

B. At least three density determinations shall be made on the final compaction operations on each course each day, and the density determinations shall be made at more frequent intervals if deemed necessary by the Engineer.

3.02 BASE COURSE

A. After spreading of the base material is completed, the entire surface shall be scarified and shaped so as to produce the exact grade and cross section after compaction. For double course base, this scarifying shall extend a depth sufficient to penetrate slightly the surface of the first course. The maximum depth of each lift shall be 8 inches.

B. When the material does not have the proper moisture content to insure the required density, wetting or drying shall be required. If the material is deficient in moisture, water will be added and uniformly mixed in by disking the base course to its full depth. If the material contains an excess of moisture, it shall be allowed to dry before being compacted. As soon as proper conditions of moisture are attained, the material shall be compacted to an average density not less than 98 percent maximum density as determined in more than one course. The density shall be obtained in each lift of the base.

C. During final compacting operations, if blading of any areas is necessary to obtain the true grade and cross section, the compacting operations for such areas shall be completed prior to making the density determination on the finished base.

D. Unless otherwise directed by the Engineer, the surface shall be "hard-planed" with a blade grader immediately prior to the application of the prime coat to remove the thin glaze or cemented surface and to allow free penetration of the prime material. The materials planed from the base shall be removed from the base area.

E. If cracks or checks appear in the base, either before or after priming, which in the opinion of the Engineer, would impair the structural efficiency of the base course, the Contractor shall remove such cracks or checks by rescarifying, reshaping, adding base material where necessary and recompacting, at no additional cost to the Owner.

F. If at any time the subgrade material shall become mixed with the base course material, the Contractor shall, without additional compensation, dig out and remove the mixture, reshape and compact the subgrade, and replace the materials removed with clean base material, which shall be shaped and compacted as specified above.

3.03 ASPHALT CONCRETE COURSES

A. The prime coat shall be applied at a rate of 0.15 gallons per square yard, and the Work shall be performed in accordance with Section 300 of the DOT Specifications.

B. The tack coat shall be applied at a rate between 0.02 and 0.10 gallons per square yard, and the Work shall be performed in accordance with Section 300 of the DOT Specifications.

C. The spreading, compacting and jointing the wearing surface shall be in accordance with Sections 330 and 331 of the DOT Specifications to the thickness indicated on the Drawings.

3.04 PAVEMENT REPAIR

A. All damage to pavement as a result of Work under this Contract shall be repaired in a manner satisfactory to the Engineer and at no additional cost to the Owner. The repair shall include the preparation of the subgrade, the placing and compacting of the limerock base, the priming of the base and the placing and maintaining of the surface treatment, all as specified herein.

B. The width of all repairs shall extend at least 12 inches beyond the limit of the damage. The edge of the pavement to be left in place shall be cut to a true edge with a saw or other acceptable method so as to provide a clean edge to abut the repair. The line of the repair shall be reasonably uniform with no unnecessary irregularities.

- END OF SECTION -

SECTION 03305

CONCRETE AND GROUT

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish all materials for concrete in accordance with the provisions of this Section and shall form, mix, place, cure, repair, finish, and do all other work as required to produce finished concrete and grout, all in accordance with the requirements of the Contract Documents.

B. The following types of concrete shall be covered in this Section:

1. Sitework Concrete: Concrete to be used for sidewalks, equipment pads, underground duct bank encasement and all other concrete appurtenant to equipment and facilities unless otherwise shown or noted on the Drawings.

C. The following types of grout are covered in this Section:

1. Cement Grout: This type of grout shall be used wherever grout or cementitious grout is called for in the Contract Documents, unless another type is specifically referenced.

2. Non-Shrink Grout: Non-shrink cementitious grout or non-shrink epoxy grout shall be used whenever non-shrink grout is called for. Non-shrink cementitious grout shall be used at locations where there are no dynamic loads, the grout will not come in contact with wastewater or wastewater gases. Non-shrink epoxy grout shall be used in submerged (water or wastewater), under wastewater gas environment, and for anchorage of pump bases, motor bases, and any other equipment imparting dynamic loads to the support system.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Division 15 – Mechanical Construction

B. Division 16 – Electrical

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Codes: Without limiting the generality of other requirements of these specifications, all work specified herein shall conform to or exceed the requirements of the Florida Building Code and the applicable requirements of the following documents to the extent that the provisions of such documents are not in conflict with the requirements of this Section.

B. Commercial Standards:

ACI 214	Recommended Practice for Evaluation of Strength Test Results of Concrete

ACI 301	Specifications for Structural Concrete for Buildings.
ACI 305	Hot Weather Concreting
ACI 306	Cold Weather Concreting
ACI 315	Manual of Standard Practice for Detailing Reinforced Concrete Structures.
ACI 318	Building Code Requirements of Reinforced Concrete.
ACI 347	Recommended Practice for Concrete Formwork.
ASTM A 185	Specification for Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement.
ASTM A 615	Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
ASTM C 31	Test Methods for Making and Curing Concrete Test Specimens in the Field.
ASTM C 33	Specification for Concrete Aggregates.
ASTM C 39	Test Method for Compressive Strength of Cylindrical Concrete Specimens.
ASTM C 88	Test Method for Soundness of Aggregates by use of Sodium Sulfate or Magnesium Sulfate
ASTM C 94	Specification for Ready-Mixed Concrete.
ASTM C 114	Method for Chemical Analysis of Hydraulic Cement
ASTM C 136	Method for Sieve Analysis of Fine and Coarse Aggregate
ASTM C 143	Test Method for Slump of Portland Cement Concrete.
ASTM C 150	Specification for Portland Cement.
ASTM C156	Test Method for Water Retention by concrete Curing Materials
ASTM C 157	Test Method for length Change of Hardened Cement Mortar and Concrete
ASTM C 192	Method of Making and Curing Concrete Test Specimens in the Laboratory
ASTM C 227	Standard Test Method for Potential Alkali Reactivity of Cement Aggregate Combinations (Mortar-Bar Method).

ASTM C 260	Specification for Air-Entraining Admixtures for Concrete.
ASTM C 289	Standard Test Method for Potential Reactivity of Aggregates (Chemical Method)
ASTM C 309	Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
ASTM C 494	Specification for Chemical Admixtures for Concrete.
ASTM C 579	Test Methods for Compressive Strength of Chemical Resistant Mortars and Monolithic Surfacings.
ASTM C 618	Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for use as a Mineral Admixture in Portland Cement Concrete
ASTM C 827	Test Method for Early Volume Change of Cemetitious Mixtures.
ASTM D 1751	Specification for Preformed Expansion Joint Fillers for Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).
CRD C 621	Non-Shrink Grout
CRSI	Manual of Standard Practice.

C. Any procedure, materials or operation specified by reference to the American Society for Testing and Materials (ASTM), the American Concrete Institute (ACI), Building Code or other references shall comply with the requirements of the current and most recent specifications or standards. In conflicts between listed standards and this specification, the more stringent requirements shall govern.

D. The Contractor is expected to obtain the most recent issue of all standards, recommendations, codes or specifications referred to within this specification.

1.04 SUBMITTALS

A. Mix Desiqns: The design mixes to be used shall be prepared by qualified persons and submitted for review. The design of the mix is the responsibility of the Contractor subject to the limitations of the specifications. Review processing of this submission will be required only as evidence the mix has been designed by qualified persons and that the minimum requirements of the specifications have been met. Such review will in no way alter the responsibility of the Contractor to furnish concrete meeting the requirements of the specifications. If in the progress of the work the sources of materials change in characteristics or the Contractor requests a new source in writing, the Contractor shall, at his expense submit new test data and information for the establishment of a new design mix. Submit mix designs for all classes of concrete to be used under this Contract. Mix design submittals shall include the following:

1. Sources of all materials and certifications of compliance with specifications for all sources of each material.

2. Certified current (less than one year old) chemical analysis of Portland Cement or Blended Cement to be used.

3. Certified current (less than one year old) chemical analysis of fly ash to be used.

4. Aggregate test results showing compliance with required standards, i.e. sieve analysis, aggregate soundness tests, etc.

5. Manufacturer's data on all admixtures stating compliance with required standards and are compatible with one another. Written conformance to the above mentioned requirements and the chloride ion content of the admixture will be required from the admixture manufacturer prior to Mix design review by the Engineer.

6. Field experience records and/or trial mix data for the proposed concrete mixes.

B. Grout: The Contractor shall submit shop drawings for all types of grout for use in this Project. Shop drawings shall include certified test results verifying the compressive strength, shrinkage, and expansion requirements specified herein; and manufacturer's literature containing instructions and recommendations on the mixing, handling, placement and appropriate uses for each type of grout used in the work.

C. Accessories: The Contractor shall submit shop drawings for all types of concrete accessories to be used for this project including, but not limited to, form ties, water stops, joint materials and curing agents.

D. Delivery Tickets: Where ready-mix concrete is used, the Contractor shall submit delivery tickets at the time of delivery of each load of concrete. Each certificate shall show the State certified equipment used for measuring and the total quantities, by weight, of cement, sand, each class of aggregate, admixtures, and the amounts of water in the aggregate and added at the batching plant as well as the amount of water allowed to be added at the site for the specific design mix. Each certificate shall, in addition, state the mix number, total yield in cubic yards, and the time of day, to the nearest minute, corresponding to when the batch was dispatched, when it left the plant, when it arrived at the job, the time that unloading began, and the time that unloading was finished.

E. Curing: Submit the following:

1. Proposed procedures for protection of concrete

1.05 QUALITY ASSURANCE

A. Tests on component materials and for compressive strength of concrete will be performed as specified herein. Test for determining slump will be in accordance with the requirements of ASTM C 143.

B. The cost of initial trial mixes and initial laboratory tests to design the mixes including compression tests, sieve analysis, and tests on trial mixes shall be included in the Contract Price.

C. The cost of all laboratory tests on cement, aggregates, and concrete, will be borne by the Owner. However, the Contractor shall be charged for the cost of any additional tests and investigation on work performed which does not meet the specifications.

D. Concrete for testing shall be supplied by the Contractor at no cost to the Owner, and the Contractor shall provide samples. The Contractor shall dispose of and clean up all excess material.

E. Construction Tolerances: The Contractor shall set and maintain concrete forms and perform finishing operations so as to ensure that the completed work is within the tolerances specified herein. Surface defects and irregularities are defined as finishes and are to be distinguished from tolerances. Tolerance is the specified permissible variation from lines, grades, or dimensions shown. Where tolerances are not stated in the Specifications, permissible deviations will be in accordance with ACI 347.

1.06 QUALITY CONTROL

A. Compressive Strength

1. Compression test specimens shall be taken during construction from the first placement of each class of concrete specified herein and at intervals thereafter as selected by the Engineer to insure continued compliance with these Specifications. At least one set of test specimens shall be made for each placement in excess of five cubic yards, or for each fifty (50) cubic yards of concrete placed, or for each 5000 square feet of surface area for slabs or walls, whichever is greater.

2. Samples of freshly mixed concrete shall be obtained in accordance with ASTM C 172, and compression test specimens for concrete shall be made in accordance with ASTM C 31. Specimens shall consist of at least five 6-inch diameter by 12-inch high cylinders, or eight 4-inch diameter by 8-inch high cylinders. Each cylinder shall be identified by a tag attached to the side of the cylinder.

3. The Contractor shall provide approved curing boxes for storage of cylinders on site. The insulated curing box shall be of sufficient size and strength to contain all the specimens made in any four consecutive working days and to protect the specimens from falling over, being jarred or otherwise disturbed during the period of initial curing. The box shall be erected, furnished and maintained by the Contractor. Such box shall be equipped to provide the moisture and to regulate the temperature necessary to maintain the proper curing conditions required by ASTM C31. Such box shall be located in an area free from vibration such as pile driving and traffic of all kinds. No concrete requiring inspection shall be delivered to the site until such storage curing box has been provided. Specimens shall remain undisturbed in the curing box until ready for delivery to the testing laboratory but not less than sixteen hours

4. Compression test shall be performed in accordance with ASTM C 39. For 6x12 cylinders, two test cylinders will be tested at 7 days and 2 at 28 days. For 4x8 cylinders, three test cylinders will be tested at 7 days and three at 28 days. The remaining cylinders will be held to verify test results, if needed.

B. Evaluation and Acceptance of Concrete

1. Evaluation and acceptance of the compressive strength of concrete shall be according to the requirements of ACI 215 and ACI 318, Chapter 5 "Concrete Quality Mixing and Placing", and as specified herein.

2. If any concrete fails to meet these requirements, immediate corrective action shall be taken to increase the compressive strength for all subsequent batches of the type of concrete affected.

3. All concrete which fails to meet the ACI requirements and these specifications, is subject to removal and replacement at the cost of the Contractor. Additional testing may also be required to verify compressive strength of concrete. Additional testing shall involve extraction and testing of concrete cores in accordance with ASTM C 42. Engineer shall determine locations where concrete cores shall be taken. Nondestructive test methods shall not be used to verify strength of in-place concrete.

1.07 DEFINITIONS

A. In these Specifications, the term "Precast Concrete" shall mean precast handholes, vaults, pull boxes, and similar structures. It does not include precast prestressed concrete elements.

PART 2 -- PRODUCTS

2.01 FORMWORK

A. Form Materials: Except as otherwise expressly accepted by the Engineer, all lumber for use as forms, shoring, or bracing shall be new material. Materials for concrete forms shall conform to the following requirements:

1. Form materials shall be metal, wood, plywood, or other acceptable material that will not adversely affect the concrete and will facilitate placement of concrete to the shape, form, line, and grade shown.

2. Plywood for concrete formwork shall be new, waterproof, synthetic resin bonded, exterior type Douglas Fir or Southern Pine plywood manufactured especially for concrete formwork and shall conform to the requirements of PS 1 for Concrete Forms, Class 1, and shall be edge sealed. Wood forms for surfaces to be painted shall be Medium Density Overlaid plywood, MDO Exterior Grade. Thickness shall be as required to support concrete at the rate it is placed, but not less than 5/8-inch thick.

B. Formwork Accessories:

1. Unless otherwise shown, exterior corners in concrete members shall be provided with ¾-inch chamfers. Re-entrant corners in concrete members shall not have fillets unless otherwise shown.

2. Form ties shall be provided with a plastic cone or other suitable means for forming a conical hole to insure that the form tie may be broken off back of the face of the concrete. The maximum diameter of removable cones for rod ties, or of other removable form-tie fasteners having a circular cross-section, shall not exceed 1-1/2 inches; and all such fasteners shall be such as to leave holes of regular shape for reaming.

3. Form ties for water-retaining structures shall have integral waterstops. Removable taper ties may be used when acceptable to the Engineer. At locations where acceptable, a preformed mechanical EPDM rubber plug shall be used to seal the hole left after the removal of the taper tie. Plugs shall be X-Plug by the Greanstreak Group, Inc., or approved equal. Friction fit plugs shall not be used.

4. Form release agent shall be a blend of natural and synthetic chemicals that employs a chemical reaction to provide quick, easy and clean release of concrete from forms. It shall not stain the concrete and shall leave the concrete with a paintable surface. Formulation of the form release agent shall be such that it would minimize formation of "Bug Holes" in cast-in-place concrete.

2.02 CONCRETE MATERIALS

A. Materials shall be delivered, stored, and handled so as to prevent damage by water or breakage. Only one brand of cement shall be used. Cement reclaimed from cleaning bags or leaking containers shall not be used. All cement shall be used in the sequence of receipt of shipments.

B. All materials furnished for the work shall comply with the requirements of ACI 301, as applicable.

C. Storage of materials shall conform to the requirements of ACI 301.

D. Materials for concrete shall conform to the following requirements:

1. Cement shall be standard brand Portland cement conforming to ASTM C 150 Type II. A single brand of cement shall be used throughout the work, and prior to its use, the brand shall be acceptable to the Engineer. The cement shall be suitably protected from exposure to moisture until used. Cement that has become lumpy shall not be used. Sacked cement shall be stored in such a manner as to as to permit access for inspection and sampling. Certified mill test reports for each shipment of cement to be used shall be submitted to the Engineer, verifying compliance with these Specifications.

2. Water shall be potable, clean, and free from objectionable quantities of silty organic matter, alkali, salts and other impurities. The water shall be considered potable, for the purposes of this Section only, if it meets the requirements of the local governmental agencies. Agricultural water with high total dissolved solids (over 1000 mg/1 TDS) shall not be used.

3. Aggregates shall be obtained from pits acceptable to the Engineer, shall be non-reactive, and shall conform to the Florida Building Code and ASTM C 33. Maximum size of coarse aggregate shall be as specified in Paragraph 2.11B.

4. Fly ash shall meet the requirements of ASTM C 618 for Class F, except the loss on ignition shall not exceed 4%. The fly ash constituent shall be maximum 15% of the total weight of the combined Portland cement and fly ash.

5. Ready-mix concrete shall conform to the requirements of ASTM C 94.

6. Air-entraining agent meeting the requirements of ASTM C 260, shall be used. Sufficient air-entraining agent shall be used to provide a total air content of 3 to 5 percent. Air-entraining agent shall be Sika AER by Sika Corp., MB-VR by Master Builders, Darex AEA by Grace, AEA-92S by Euclid Chemical Company, or equal.

7. Water reducing and retarding admixtures shall be required at the Engineer's discretion or, if not required, may be added at the Contractor's option to control the set, effect water reduction, and increase workability. In either case, the addition of an admixture shall be at no additional cost to the Owner. The use of an admixture shall be subject to acceptance by the Engineer. Admixtures permitted shall conform to the requirements of ASTM C 494 (chemical admixtures). Admixtures shall contain no free chloride ions, be non-toxic after 30 days and shall be compatible with and made by the same manufacturer as the air entraining admixture.

2.03 CURING MATERIALS

A. Materials for curing concrete conform to ASTM C 309 Type 1-D, Class B with a minimum solids content of 30% and shall contain a fugitive dye. Curing compound shall be SureCure 30 by Kaufman Products, Inc., CA D.O.T. Acrylic Cure by Symons Corporation, Sealtight CS-309-30 by W. R. Meadows, or approved equal.

B. Polyethylene sheet for use as a concrete curing blanket shall be white and have a nominal thickness of 6 mils.

2.04 JOINT MATERIALS

A. Materials for joints in concrete shall conform to the following requirements:

1. Expansion Joint Material shall be non-extruding, and shall be one of the following types:

   a. Type I – Sponge rubber, conforming to ASTM D1752, Type I

   b. Type II – Cork, conforming to ASTM D1752, Type II

   c. Type III – Self-expanding cork, conforming to ASTM D1752, Type III

   d. Type IV – Bituminous fiber, conforming to ASTM Designation D1752

2. Elastomeric joint sealer shall be a single component polyurethane sealant meeting ASTM C-920, Type S, Grade NS, Class 25, Use NT, M, A, and O. Capable of withstanding 25% in extension or compression such as Sikaflex 1A by Sika Corporation or approved equal.

3. Joint sealer to be submerged in liquids shall be a multi-component, non-sag, low-modulus polyurethane rubber sealant meeting ASTM C-920, Type M, Grade NS, Class 25, use NT, M, A, and O. Capable of withstanding 50% in extension or compression such as Sikaflex-2C NS/SL, Sika Corporation, or approved equal.

4. Joint sealer submerged in liquids with high concentration of chlorine (>2 ppm) shall be a multi-component chemical resistant polysulfide sealant conforming to ASTM C-920, Type M, Grade NS, Class 25 such as Sonolastic Two Part by BASF Construction Chemicals, or approved equal.

5. Joint sealer in horizontal joints exposed to vehicular traffic shal be a nonsag, Multi Component, traffic grade polyurethane sealant meeting ASTM C920, Type 19, Grate NS, Class 25, use T, M, A, and O. DynaTread by Pecora Corporation, or approved equal.

B. Joint Cleaner: Joint cleaner shall be as recommended by the sealant caulking compound manufacturer.

C. Joint Primer: Joint primer shall be as recommended by sealant manufacturer.

2.05 REINFORCING STEEL

A. General: All reinforcing steel for all reinforced concrete construction shall conform to the following requirements:

1. Bar reinforcement shall conform to the requirements of ASTM A 615 for Grade 60 Billet Steel Reinforcement, and shall be manufactured in the United States. All reinforcing steel shall have the manufacturer's mill marking rolled into the bar which shall indicate the producer, size, type and grade. All reinforcing bars shall be deformed bars. Smooth reinforcing bars shall not be used unless specifically called for on the Drawings.

2. Welded wire fabric reinforcement shall conform to the requirements of ASTM A185. All welded wire fabric reinforcement shall be galvanized.

B. Field welding of reinforcing steel will not be allowed.

C. Accessories: Accessories shall include all necessary bolsters, chairs, spacers and other devices for supporting and fastening reinforcing in place complying with CRSI recommendations conforming to Class 1 bar supports. Bolsters for slab on grade shall have gray plastic tipped legs.

D. Concrete blocks (dobies), used to support and position reinforcement steel, shall have the same or higher comprehensive strength as specified for the concrete in which it is located. Where the concrete blocks are used on concrete surfaces exposed to view, the color and texture of the concrete blocks shall match that required for the finished surface. Wire ties shall be embedded in concrete block bar supports.

2.06 MECHANICAL COUPLERS

A. Mechanical couplers shall develop a tensile strength which exceeds 100 percent of the ultimate tensile strength and 125 percent of the yield strength of the reinforcing bars being spliced. The reinforcing steel and coupler used shall be compatible for obtaining the required strength of the connection.

B. Where the type of coupler used is composed of more than one component, all components required for a complete splice shall be supplied.

C. Hot forged sleeve type couplers shall not be used. Acceptable mechanical couplers are LENTON LOCK B-Series Mechanical Rebar Splicing System by ERICO, or approved equal. Mechanical couplers shall only be used where shown on the Drawings or where specifically approved by the Engineer.

D. Where the threaded rebar to be inserted into the coupler reduces the diameter of the bar, the threaded rebar piece shall be provided by the coupler manufacturer.

2.07 DOWEL ADHESIVE SYSTEM

A. Where shown on the Drawings, reinforcing bars anchored into hardened concrete with a dowel adhesive system shall use a two-component adhesive mix which shall be injected with a static mixing nozzle following manufacturer's instructions.

B. All holes shall be drilled with a carbide bit unless otherwise recommended by the manufacturer. If coring holes is allowed by the manufacturer and approved by the Engineer, cored holes shall be roughened in accordance with manufacturer requirements.

C. Thoroughly clean drill holes of all debris, drill dust, and water in accordance with manufacturer’s instructions with compressed air and a wire brush prior to installation of adhesive and reinforcing bar.

D. Degree of hole dampness shall be in strict accordance with manufacturer recommendations. Installation conditions shall be either dry or water-saturated. Water filled or submerged holes shall not be permitted unless specifically approved by the Engineer.

E. Injection of adhesive into the hole shall be performed in a manner to minimize the formation of air pockets in accordance with the manufacturer’s instructions.

F. Embedment Depth:

1. The embedment depth of the bar shall be as show on the Drawings. Although all manufacturers listed below are permitted, the embedment depth shown on the Drawings is based on “SET-XP” by Simpson Strong-Tie Co. If the Contractor submits one of the other named dowel adhesives from the list below, the Engineer shall evaluate the required embedment and the Contractor shall provide the required embedment depth stipulated by the Engineer specific to the approved dowel adhesive.

2. Where the embedment depth is not shown on the Drawings, the embedment depth shall be determined to provide the minimum allowable bond strength equal to the tensile strength of the rebar according to the manufacturer's ICC-ES ESR.

3. The embedment depth shall be determined using the actual concrete compressive strength, a cracked concrete state, maximum long term temperature of 110 degrees F, and maximum short term temperature of 140 degrees F. In no case shall the embedment depth be less than the minimum, or more than the maximum, embedment depths stated in the manufacturer's ICC-ES ESR.

G. Engineer's approval is required for use of this system in locations other than those shown on the Drawings.

H. The adhesive system shall be IBC compliant for use in both cracked and uncracked concrete, must comply with the latest revision of ICC-ES Acceptance Criteria AC308, and shall have a valid ICC-ES report. The adhesive system shall be "Epcon System G5" as manufactured by ITW Redhead, " HIT-HY 200 Injection Adhesive Anchor System" as manufactured by Hilti, Inc. "SET-XP" as manufactured by Simpson Strong-Tie Co. or "PE-1000+" by Powers Fasteners. Fast-set epoxy formulations shall not be acceptable.

I. All individuals installing dowel adhesive system shall be certified as an Adhesive Anchor Installer in accordance with the ACI-CRSI Anchor Installation Certification Program.

2.08 READY-MIXED CONCRETE

A. Ready-mixed concrete shall conform to materials, batching, mixing, transporting, and placing as specified herein and in accordance with ASTM C 94.

B. Ready-mixed concrete shall be delivered to the site of the work, and discharge shall be completed within one and one half hour after the addition of the cement to the aggregates or before the drum has been revolved 250 revolutions, whichever is first. In hot weather, or under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 85 degrees F or above, the time between the introduction of the cement to the aggregates and discharge shall not exceed 60 minutes.

2.09 CEMENT GROUT

A. Cement grout shall be composed of Portland cement and sand in the proportion specified in the Contract Documents and the minimum amount of water necessary to obtain the desired consistency. If no proportion is indicated, cement grout shall consist of one part Portland cement to three parts sand. Water amount shall be as required to achieve desired consistency without compromising strength requirements. White Portland cement shall be mixed with Portland cement as required to match color of adjacent concrete.

B. The minimum compressive strength at 28 days shall be 4000 psi.

C. For beds thicker than 1-1/2 inch and/or where free passage of grout will not be obstructed by coarse aggregate, 1-1/2 parts of coarse aggregate having a top size of 3/8 inch should be added. This stipulation does not apply for grout being swept in by a mechanism. These applications shall use a plain cement grout without coarse aggregate regardless of bed thickness.

D. Sand shall conform to the requirements of ASTM C144.

2.10 NON-SHRINK GROUT

A. Non-shrink Cement Grout:

1. Non-shrink cement grout shall be a prepackaged, inorganic, non-gas liberating, nonmetallic, cement-based grout requiring only the addition of water. Manufacturer's instructions shall be printed on each bag or other container in which the materials are packaged. The specific formulation for each class of nonshrink grout specified herein shall be that recommended by the manufacturer for the particular application.

2. Non-shrink cement grouts shall have a minimum 28 day compressive strength of 5000 psi (ASTM C109, restrained), shall have no shrinkage (0.0 percent) and a maximum 4.0 percent expansion in the plastic state when tested in accordance with ASTM C 827, and shall have no shrinkage (0.0 percent) and a maximum of 0.2 percent expansion in the hardened state when tested in accordance with CRD C 621.

3. Cement based grout shall be Five Star Grout as manufactured by Five Star Products, Inc., Fairfield, Connecticut, or approved equal.

4. Cementitious non-shrink grout shall be used at locations where there are no dynamic loads, the grout will not come in contact with wastewater or wastewater gases, and where non-shrink grout is identified on the Drawings. Applications include, but are not limited to, structural steel column base plates, gate frames and guides, and precast concrete to cast-in-place concrete joints.

B. Non-shrink Epoxy Grout:

1. Epoxy-based non-shrink grout shall be a three component, 100 percent solids, solvent-free system designed for machinery grouting. Applications include, but are not limited to, anchoring, pump and motor bases, and any other equipment imparting dynamic loads to the support system.

2. When non-shrink grout is identified on the Drawings in submerged (water or wastewater) or under wastewater gas environment, epoxy-based non-shrink grouts shall be used.

3. The epoxy grout shall be delivered to site as prepackaged, three-component systems composing of the resin, hardener, and specially blended aggregates. The components shall be stored as recommended by the manufacturer until use.

4. Non-shrink epoxy grout shall be Five Star DP Epoxy Grout by Five Star Products, Inc., Fairfield, Connecticut, or approved equal.

2.11 BONDING COMPOUND

A. For bonding freshly-mixed, plastic concrete to hardened concrete, Sikadur 32 Hi-Mod Epoxy Adhesive, as manufactured by Sika Corporation; Concresive Liquid (LPL), as manufactured

by Master Builders; BurkEpoxy MV as manufactured by The Burk Company; or approved equal shall be used.

2.12 CONCRETE DESIGN REQUIREMENTS

A. General: Concrete shall be composed of cement, admixtures, aggregates, and water. These materials shall be of the qualities specified. The exact proportions in which these materials are to be used for different parts of the work will be determined during the trial batch. In general, the mix shall be designed to produce a concrete capable of being deposited so as to obtain maximum density and minimum shrinkage and, where deposited in forms, to have good consolidation properties and maximum smoothness of surface. The aggregate gradations shall be formulated to provide fresh concrete that will not promote rock pockets around reinforcing steel or embedded items. The proportions shall be changed whenever necessary or desirable to meet the required results at no additional cost to the Owner. All changes shall be subject to review by the Engineer.

B. Water-Cement Ratio and Compressive Strength: The minimum compressive strength and cement content of concrete shall be not less than that specified in the following tabulation.

Type of Work	Min. 28-Day Compressive Strength (psi)	Max. Size Aggregate (in.)	Min. Cement per cu yd (sacks)	Max. W/C Ratio (by wt.)
Sitework Concrete:	3,000 (Class B)	3/4	5.0	0.50

Note: One sack of cement equals 94 lbs.

C. Adjustments to Mix Design: The mixes used shall be changed whenever such change is necessary or desirable to secure the required strength, density, workability, and surface finish, and the Contractor shall be entitled to no additional compensation because of such changes.

2.13 CONSISTENCY

A. The consistency of the concrete in successive batches shall be determined by slump tests in accordance with ASTM C 143. Slumps shall be 4-inches +/- 1-inche measured at the form.

PART 3 – EXECUTION

3.01 GENERAL FORMWORK REQUIREMENTS

A. Forms to confine the concrete and shape it to the required lines shall be used wherever necessary. The Contractor shall assume full responsibility for the adequate design of all forms, and any forms which are unsafe or inadequate in any respect shall promptly be removed and replaced at the Contractor's expense. All design, construction, maintenance, preparation, and removal of forms shall be in accordance with the FBC, ACI 347 and the requirements specified herein.

B. All forms shall be true in every respect to the required shape and size, shall conform to the established alignment and grade, and shall be of sufficient strength and rigidity to maintain their position and shape under the loads and operations incident to placing and vibrating the concrete.

3.02 FORMWORK CONSTRUCTION

A. Vertical Surfaces: All vertical surfaces of concrete members shall be formed, except where placement of the concrete against the ground is called for by the Engineer.

B. Construction Joints: Concrete construction joints will not be permitted at locations other than those shown or specified, except as may be acceptable to the Engineer. When a second lift is placed on hardened concrete, special precautions shall be taken in the way of the number, location, and tightening of ties at the top of the old lift and bottom of the new to prevent any unsatisfactory effect whatsoever on the concrete.

C. Form Ties: Wire ties for holding forms will not be permitted. No form-tying device or part thereof, other than metal, shall be left embedded in the concrete. Ties shall not be removed in such manner as to leave a hole extending through the interior of the concrete members. The use of snap-ties which cause spilling of the concrete upon form stripping or tie removal will not be permitted. If steel panel forms are used, rubber grommets shall be provided where the ties pass through the form in order to prevent loss of cement paste. Where metal rods extending through the concrete are used to support or to strengthen forms, the rods shall remain embedded and shall terminate not less than 1 inch back from the formed face or faces of the concrete.

3.03 REUSE OF FORMS

A. Forms may be reused only if in good condition and only if acceptable to the Engineer. Light sanding between uses will be required wherever necessary to obtain uniform surface texture on all exposed concrete surfaces. Exposed concrete surfaces are defined as surfaces which are permanently exposed to view.

3.04 REMOVAL OF FORMS

A. Careful procedures for the removal of forms shall be strictly followed, and this work shall be done with care so as to avoid injury to the concrete. No heavy loading on green concrete will be permitted. Members which must support their own weight shall not have their forms removed until they have attained at least 75 percent of the 28-day strength of the concrete as specified herein. Forms for all vertical walls and columns shall remain in place at least 2 days after the concrete has been placed. Forms for all parts of the Work not specifically mentioned herein shall remain in place for periods of time as determined by the Engineer.

3.05 FABRICATION OF REINFORCING STEEL

A. Reinforcing steel shall be accurately formed to the dimensions and shapes shown on the Drawings, and the fabricating details shall be prepared in accordance with ACI 315 and ACI 318, except as modified by the Drawings.

B. Bending or Straightening: Reinforcement shall not be straightened or rebent in a manner which will injure the material. Bars with kinks or bends not shown shall not be used. All bars

shall be bent cold, unless otherwise permitted by the Engineer. No bars partially embedded in concrete shall be field-bent except as shown or specifically permitted by the Engineer.

3.06 PLACING REINFORCING STEEL

A. Reinforcing steel shall be accurately positioned as shown on the Drawings, and shall be supported and wired together to prevent displacement, using annealed iron wire ties or suitable clips at intersections. All reinforcing steel shall be supported by concrete, plastic or metal supports, spacers or metal hangers which are strong and rigid enough to prevent any displacement of the reinforcing steel. Where concrete is to be placed on the ground, supporting concrete blocks (or dobies) shall be used, in sufficient numbers to support the bars without settlement, but in no case shall such support be continuous. All concrete blocks used to support reinforcing steel shall be tied to the steel with wire ties which are embedded in the blocks. For concrete over formwork, the Contractor shall furnish concrete, metal, plastic, or other acceptable bar chairs and spacers.

B. The portions of all accessories in contact with the formwork shall be made of concrete, plastic, or steel coated with a 1/8 inch minimum thickness of plastic which extends at least 1/2 inch from the concrete surface. Plastic shall be gray in color.

C. Tie wires shall be bent away from the forms in order to provide the specified concrete coverage.

D. Bars additional to those shown which may be found necessary or desirable by the Contractor for the purpose of securing reinforcement in position shall be provided by the Contractor at its own expense.

E. Reinforcement placing tolerances shall be within the limits specified in ACI 318, unless otherwise directed by the Engineer.

F. Welded wire fabric reinforcement placed over horizontal forms shall be supported on slab bolsters having gray, plastic-coated standard type legs as specified herein. Slab bolsters shall be spaced not less than 30 inches on centers, shall extend continuously across the entire width of the reinforcing mat, and shall support the reinforcing mat in the plane shown.

G. Welded wire fabric placed over the ground shall be supported on wired concrete blocks (dobies) spaced not more than 3 feet on centers in any direction. The construction practice of placing welded wire fabric on the ground and hooking into place in the freshly placed concrete shall not be used.

3.07 CLEANING AND PROTECTION OF REINFORCING STEEL

A. Reinforcing steel shall at all times be protected from conditions conducive to corrosion until concrete is placed around it.

B. The surfaces of all reinforcing steel and other metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before the concrete is placed. Where there is a delay in depositing concrete, reinforcing shall be reinspected and, if necessary, recleaned.

3.08 PREPARATION OF SURFACES FOR CONCRETING

A. General: No concrete shall be placed until the reinforcement steel and formwork have been erected in a manner acceptable to the Engineer. The Contractor shall notify the Engineer not less than two working days prior to concrete placement, allowing for inspection and any corrective measures which are required. Earth surfaces shall be thoroughly wetted by sprinkling, prior to the placing of any concrete, and these surfaces shall be kept moist by frequent sprinkling up to the time of placing concrete thereon. The surface shall be free from standing water, mud, and debris at the time of placing concrete.

B. Joints in Concrete: Concrete surfaces upon or against which concrete is to be placed, where the placement of the old concrete has been stopped or interrupted so that, as determined by the Engineer, the new concrete cannot be incorporated integrally with that previously placed, are defined as construction joints. The surfaces of horizontal joints shall be given a compacted, roughened surface for good bond. Except where the Drawings call for joint surfaces to be coated, the joint surfaces shall be cleaned of all laitance, loose or defective concrete, and foreign material. Such cleaning shall be accomplished by sandblasting, followed by thorough washing. All pools of water shall be removed form the surface of construction joints before the new concrete is placed.

C. Existing concrete surfaces upon or against which concrete is to be placed shall be given a roughened surface for good bond. Joint surfaces shall be cleaned of all laitance, loose or defective concrete, and foreign material. Such cleaning shall be accomplished by hydroblasting. All pools of water shall be removed from the surface of construction joints before the new concrete is placed.

D. Placing Interruptions: When placing of concrete is to be interrupted long enough for the concrete to take a set, the working face shall be given a shape by the use of forms or other means that will secure proper union with subsequent work, provided that construction joints shall be made only where acceptable to the Engineer.

E. Embedded Items: No concrete shall be placed until all formwork, installation of parts to -be embedded, reinforcement steel, and preparation of surfaces involved in the placing have been completed and accepted by the Engineer at east 4 hours before placement of concrete. All surfaces of forms and embedded items that have become encrusted with dried grout from concrete previously placed shall be cleaned of all such grout before the surrounding or adjacent concrete is placed.

F. All reinforcement, anchor bolts, sleeves, inserts, and similar items shall be set and secured in the forms where shown on the Drawings or by shop drawings and shall be acceptable to the Engineer before any concrete is placed. Accuracy of placement is the responsibility of the Contractor.

G. Casting Against Old Concrete: Where concrete is to be cast against old concrete (any concrete which is greater than 60 days of age), the surface of the old concrete shall be thoroughly cleaned and roughened by hydro-blasting (exposing aggregate) prior to the application of an epoxy bonding agent. Application shall be according to the bonding agent manufacturer's instructions and recommendations.

H. No concrete shall be placed in any structure until all water entering the space to be filled with concrete has been properly cut off or has been diverted by pipes, or other means, and

carried out of the forms, clear of the work. No concrete shall be deposited under water nor shall the Contractor allow still water to rise on any concrete until the concrete has attained its initial set. Water shall not be permitted to flow over the surface of any concrete in such manner and at such velocity as will injure the surface finish of the concrete. Pumping or other necessary dewatering operations for removing ground water, if required, will be subject to the review of the Engineer.

I. Openings for pipes, inserts for pipe hangers and brackets, and the setting of anchors shall, where practicable, be provided for during the placing of concrete.

J. Corrosion Protection: Pipe, conduit, dowels, and other ferrous items required to be embedded in concrete construction shall be so positioned and supported prior to placement of concrete that there will be a minimum of 2 inches clearance between said items, and any part of the concrete reinforcement will not be permitted.

K. Cleaning: The surfaces of all metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before the concrete is placed.

3.09 MIXING, HANDLING, TRANSPORTING, AND PLACING

A. General: Placing of concrete shall conform to the applicable requirements of Chapter 8 of ACI 301 and the requirements of this Section.

B. Mixing: Mixing of concrete shall conform to the requirements of Chapter 7 of ACI 301.

C. Retempering: Retempering of concrete or mortar which has partially hardened will not be permitted.

D. Non-Conforming Work or Materials: Concrete which upon or before placing is found not to conform to the requirements specified herein shall be rejected and immediately removed from the Work. Concrete which is not placed in accordance with these Specifications, or which is of inferior quality, shall be removed and replaced by and at the expense of the Contractor.

E. Unauthorized Placement: No concrete shall be placed except in the presence of duly authorized representative of the Owner. The Contractor shall notify the Engineer in writing at least 24 hours in advance of placement of any concrete.

F. Temperature of Concrete: The temperature of concrete, when it is being placed, shall not be more than 90 degrees F nor less than 40 degrees F in moderate weather, and not less than 50 degrees F in whether during which the mean daily temperature drops below 40 degrees F. Concrete ingredients shall not be heated to a temperature higher than that necessarily to keep the temperature of the mixed concrete, as placed, from falling below the specified minimum temperature. If concrete is placed when the weather is such that the temperature of the concrete would exceed 90 degrees F, the Contractor shall employ effective means, such as precooling of aggregates and mixing water using ice or placing at night, as necessary to maintain the temperature of the concrete, as it is placed, below 90 degrees F. The Contractor shall be entitled to no additional compensation on account of the foregoing requirements.

3.10 PUMPING OF CONCRETE

A. If the pumped concrete does not produce satisfactory end results, the Contractor shall discontinue the pumping operation and proceed with the placing of concrete using conventional methods.

B. The minimum diameter of the hose (conduits) shall be 4 inches.

C. Minimum compressive strength, cement content, and maximum size of aggregates shall be as specified herein. Gradation of coarse aggregates shall conform to ASTM C 33 and shall be as close to the middle range as possible. Gradation of fine aggregate shall conform to ASTM C 33, with 15 to 30 percent passing the number 50 screen and 5 to 1 0 percent passing the number 1 00 screen. The fineness modulus of sand shall not be over 3.00.

3.11 TAMPING AND VIBRATING

A. As concrete is placed in the forms or in excavations, it shall be thoroughly settled and compacted, throughout the entire depth of the layer which is being consolidated, into a dense homogeneous mass, filling all comers and angles, thoroughly embedding the reinforcement, eliminating rock pockets, and bringing only a slight excess of water to the exposed surface of concrete during placement. Vibrators shall be high speed power vibrators (8,000 or 10,000 rpm) of an immersion type in sufficient number and with (at least one) standby units as required.

B. Concrete in walls shall be internally vibrated and at the same time rammed, stirred, or worked with suitable appliances, tamping bars, shovels, or forked tools until it completely fills the forms or excavations and closes snugly against all surfaces. Subsequent layers of concrete shall not be placed until the layers previously placed have been worked thoroughly as specified. Vibrators shall be provided in sufficient numbers, with standby units as required, to accomplish the results herein specified with 15 minutes after concrete of the prescribed consistency is placed in the forms. The vibrating head shall be kept from contact with the surfaces of the forms. Care shall be taken not to vibrate concrete excessively or to work it in any manner that causes segregation of its constituents.

3.12 FINISHING CONCRETE SURFACES

A. General: Surfaces shall be free from fins, bulges, ridges, offsets, honeycombing, or roughness of any kind, and shall present a finished, smooth, continuous hard surface. Allowable deviations from plumb or level and from the aligranent, profiles, and dimensions shown on the Drawings are defined as tolerances and are specified herein. These tolerances are to be distinguished from irregularities in finish as described herein. Aluminum finishing tools shall not be used.

B. Formed Surfaces: After removal of forms, the finishes described below shall be applied in accordance with Article 3.13, D. Unless the finish schedule specifies otherwise, all surfaces shall receive at least a Type I finish. The Engineer shall be the sole judge of acceptability of all concrete finish work.

1. Type I - Rough: All fins, burrs and other projections left by the forms shall be removed. All holes left by removal of ends of ties, and all other holes, depressions, or voids shall be filled solid with cement grout after first being thoroughly wetted.

Honeycombs shall be chipped back to solid concrete as directed, prior to patching with cement grout. Holes shall be filled with a small tool that will permit packing the hole solidly with cement grout. Cement grout shall consist of one part cement to three parts sand, and the amount of mixing water shall be as little as consistent with the requirements of handling and placing. Color of cement grout shall match the adjacent wall surface. At locations where concrete coatings are specified to be applied, epoxy based patch material or filler surfaces compatible with the coating shall be used in lieu of cement grout specified herein. Concrete finish shall be in strict conformance to the coating / paint manufacturer's recommendations.

2. Type II - Grout Cleaned: Where this finish is required, it shall be applied after completion of Type I finish. After the concrete has been predampened, slurry consisting of one part cement (including an appropriate quantity of white cement in order to produce a color matching the surrounding concrete) and 1-1/2 parts sand passing the No. 16 sieve, by damp loose volume, shall be spread over the surface with clean burlap pads or sponge rubber floats. Any surplus shall be removed by scraping and then rubbing with clean burlap. The finish shall be kept damp for at least 36 hours after application.

3. Type III - Smooth Rubbed: Where this finish is required, it shall be applied after the completion of the Type I finish. No rubbing shall be done before the concrete is thoroughly hardened and the mortar used for patching is firmly set. A smooth, uniform surface shall be obtained by wetting the surface and rubbing it with a carborundum stone to eliminate irregularities. Unless the nature of the irregularities requires it, the general surface of the concrete shall not be cut into. Corners and edges shall be slightly rounded by the use of the carborundum stone. Brush finishing or painting with grout or neat cement will not be permitted.

C. CONCRETE FINISH SCHEDULE

Item	**Type of Finish**
Exterior concrete above and/or below grade	I

3.13 CURING AND DAMPPROOFING

A. All concrete shall be cured for not less than 14 days after placing, in accordance with the methods specified herein for the different parts of the work, and described in detail in the following paragraphs.

FINISH SCHEDULE

Surface to be Cured or Dampproofed	Method
Equipment pads, encasement concrete and thrust blocks	1
All concrete surfaces not specifically provided for elsewhere in this Paragraph	2

B. Method 1: The surface shall be covered with moist earth not less than 4 hours, nor more than 24 hours, after the concrete is placed. Earthwork operations that may damage the concrete shall not begin until at least 7 days after placement of concrete.

C. Method 2: The surface shall be sprayed with a liquid curing compound. It shall be applied in accordance with the manufacturers printed instructions at a maximum coverage rate of 200 square feet per gallon and in such a manner as to cover the surface with a uniform film which will seal thoroughly.

D. Care shall be exercised to avoid damage to the seal during the curing period. Should the seal be damaged or broken before the expiration of the curing period, the break shall be repaired immediately by the application of additional curing compound over the damaged portion.

E. Wherever curing compound may have been applied by mistake to faces against which concrete subsequently is to be placed and to which it is to adhere, said compound shall be entirely removed by hydroblasting just prior to the placing of new concrete.

F. Curing compound shall be applied as soon as the concrete has hardened enough to prevent marring on uniformed surfaces, and within 2 hours after removal of forms from contact with formed surfaces. Repairs required to be made to formed surfaces shall be made within the said 2-hour period; provided, however, that any such repairs which cannot be made within the said 2-hour period shall be delayed until after the curing compound has been applied. When repairs are to be made to an area on which curing compound has been applied, the area involved shall first be wet-sandblasted to remove the curing compound, following which repairs shall be made as provided herein.

3.14 PROTECTION

A. The Contractor shall protect all concrete against injury until final acceptance by the Engineer. Fresh concrete shall be protected from damage due to rain. The Contractor shall provide such protection while the concrete is still plastic and whenever such precipitation is imminent or occurring.

3.15 TREATMENT OF SURFACE DEFECTS

A. As soon as forms are removed, all exposed surfaces shall be carefully examined and any irregularities shall be immediately rubbed or ground in a satisfactory manner in order to secure a smooth, uniform, and continuous surface. Plastering or coating of surfaces to secure a smooth, uniform, and continuous surface. Plastering or coating of surfaces to be smoothed will not be permitted. No repairs shall be made until after inspection by the Engineer. In no case will extensive patching of honeycombed concrete be permitted. Concrete containing minor voids, holes, honeycombing, or similar depression defects shall have them repaired as specified herein. Concrete containing extensive voids, holes, honeycombing, or similar depression defects, shall be completely removed and replaced. All repairs and replacements herein specified shall be promptly executed by the Contractor at its own expense.

B. Defective surfaces to be repaired shall be cut back from trueline a minimum depth of 1/2 inch over the entire area. Feathered edges will not be permitted. Where chipping or cutting

tools are not required in order to deepen the area properly, the surface shall be prepared for bonding by the removal of all laitance or soft material, and not less than 1/32 inch depth of the surface film from all hard portions, by means of an efficient sandblast. The material used for repair proposed shall be acceptable to the Engineer.

C. Holes left by tie-rod cones shall be reamed with suitable toothed reamers so as to leave the surfaces of the holes clean and rough. These holes then shall be repaired in an approved manner with dry-packed cement grout. Holes left by form-tying devices having a rectangular cross-section, and other imperfections having a depth greater than their least surface dimension, shall not be reamed, but shall be repaired in an approved manner with dry-packed cement grout.

D. All repairs shall be built up and shaped in such a manner that the completed work will conform to the requirements of this Section, using approved methods which will not disturb the bond, cause sagging, or cause horizontal fractures. Surfaces of said repairs shall receive the same kind and amount of curing treatment as required for the concrete in the repaired section.

3.16 CARE AND REPAIR OF CONCRETE

A. The Contractor shall protect all concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance by the Owner. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at any time prior to the final acceptance of the completed work, or which departs from the established line or grade, or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with acceptable concrete at the Contractor's expense. This stipulation includes concrete experiencing cracking due to drying or thermal shrinkage of the concrete. Structural cracks shall be repaired using an epoxy injection system approved by the Engineer. Non-structural cracks shall be repaired using a hydrophilic resin pressure injected grout system approved by the Engineer, unless other means or repair are deemed necessary and approved by the Engineer.

3.17 GROUT INSTALLATION

A. All surface preparation, curing, and protection of cement grout shall be as specified herein. The finish of the grout surface shall match that of the adjacent concrete.

B. The Contractor through the manufacturer of non-shrink grout shall provide on-site technical assistance upon request, at no additional cost to the Owner.

C. All mixing, surface preparation, handling, placing, consolidation, and other means of execution for prepackaged grouts shall be done according to the instructions and recommendations of the manufacturer.

D. Grout shall be placed in such a manner, for the consistency necessary for each application, so as to assure that the space to be grouted is completely filled.

- END OF SECTION -

SECTION 05010

METAL MATERIALS

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Metal materials not otherwise specified shall conform to the requirements of this Section.

1.02 SUBMITTALS

A. Material certifications shall be submitted along with any shop drawings for metal products and fabrications required by other sections of the Specifications.

1.03 QUALITY ASSURANCE

A. Owner may engage the services of a testing agency to test any metal materials for conformance with the material requirements herein. If the material is found to be in conformance with Specifications the cost of testing will be borne by the Owner. If the material does not conform to the Specifications, the cost of testing shall be paid by the Contractor and all materials not in conformance as determined by the Engineer shall be replaced by the Contractor at no additional cost to the Owner. In lieu of replacing materials the Contractor may request further testing to determine conformance, but any such testing shall be paid for by the Contractor regardless of outcome of such testing.

PART 2 -- PRODUCTS

2.01 CARBON AND LOW ALLOY STEEL

A. Material types and ASTM designations shall be as listed below:

1. Structural W Shapes	A 992 (50 ksi)
2. Structural S, M, C, L Shapes	A 36 (36 ksi)
3. Structural HP Shape	A 572, Grade 50 (50 ksi)
4. Structural Tubing	A 500, Grade B or A 501 (42 ksi)
5. Structural Pipe	A 53, Type E or S, Grade B (35 ksi)
6. Plates and Bars	A 36 U.N.O. (36 ksi)
7. Sheet Steel	A 570, Grade C
8. Cold-Formed Structural Studs and Joists (18-22 gauge)	A 446, Grade C

8. Cold-Formed Structural Studs and Joists (12-16 gauge) — A 446, Grade D

2.02 STAINLESS STEEL

A. All stainless steel fabrications shall be Type 316.

B. Material types and ASTM designations are listed below:

1. Plates and Sheets — ASTM A167 or A666 Grade A
2. Structural Shapes — ASTM A276

2.03 ALUMINUM

A. All aluminum shall be alloy 6061-T6, unless otherwise noted or specified herein.

B. Material types and ASTM designations are listed below:

1. Structural Shapes — ASTM B308
2. Castings — ASTM B26, B85, or B108
3. Extruded Bars — ASTM B221 - Alloy 6061
4. Extruded Rods, Shapes and Tubes — ASTM B221 - Alloy 6063
5. Plates — ASTM B209 - Alloy 6061
6. Sheets — ASTM B221 - Alloy 3003

C. All aluminum structural members shall conform to the requirements of Section 05140 entitled "Structural Aluminum".

D. All aluminum shall be provided with mill finish unless otherwise noted.

E. Where bolted connections are indicated, aluminum shall be fastened with Type 316 stainless steel bolts.

F. Aluminum in contact with dissimilar materials shall be insulated with an approved dielectric.

2.04 CAST IRON

A. Material types and ASTM designations are listed below:

1. Gray ASTM A48 Class 30B
2. Malleable ASTM A47
3. Ductile ASTM A536 Grade 60-40-18

2.05 BRONZE

A. Material types and ASTM designations are listed below:

1. Rods, Bars and Sheets ASTM B138 - Alloy B Soft

2.06 HASTELLOY

A. All Hastelloy shall be Alloy C-276.

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION –

SECTION 05050

METAL FASTENING

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish all materials, labor, and equipment required to provide all metal welds and fasteners not otherwise specified, in accordance with the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 05010 - Metal Materials

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

1. Florida Building Code

2.	AC 193	Acceptance Criteria for Mechanical Anchors in Concrete Elements
3.	AC 308	Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements
4.	ACI 318	Building Code Requirements for Structural Concrete
5.	ACI 355.2	Qualifications of Post-Installed Mechanical Anchors in Concrete
6.	AISC 348	The 2009 RCSC Specification for Structural Joints
7.	AISC	Specification for Structural Joints Using ASTM A325 or A490 Bolts.
8.	AISC	Code of Standard Practice
9.	AWS D1.1	Structural Welding Code - Steel
10.	AWS D1.2	Structural Welding Code – Aluminum
11.	AWS D1.6	Structural Welding Code – Stainless Steel
12.	Aluminum Association	Specifications for Aluminum Structures

13.	ASTM A572/A572M-94C	Standard Specification for High Strength Low-Alloy Columbium-Vanadium Structural Steel Grade 50
14.	ASTM A36	Standard Specification for Carbon Structural Steel
15.	ASTM A307	Standard Specification for Carbon Steel Externally Threaded Standard Fasteners
16.	ASTM A325	Standard Specification for High-Strength Bolts for Structural Steel Joints
17.	ASTM E488	Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements
18.	ASTM F436	Standard Specification for Hardened Steel Washers
19.	ASTM A489	Standard Specification for Eyebolts
20.	ASTM A490	Standard Specification for Quenched and Tempered Alloy Steel Bolts for Structural Steel Joints
21.	ASTM A563	Standard Specifications for Carbon and Alloy Steel Nuts
22.	ASTM F593	Standard Specification for Stainless Steel Bolts; Hex Cap Screws, and Studs
23.	ASTM F594	Standard Specification for Stainless Steel Nuts
24.	ASTM D1785	Standard Specification for Polyvinyl Chloride (PVC) Plastic Pipe
25.	ASTM F1554	Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength

1.04 SUBMITTALS

A. Submit the following items in accordance with Section 01300 entitled "Submittals":

1. Shop Drawings providing the fastener's manufacturer and type and certification of the fastener's material and capacity.

2. Manufacturer’s installation instructions.

3. Welder certifications for each person who is to perform field welding. Certifications shall be from a recognized testing laboratory.

4. Certified weld inspection reports, when required.

5. Welding procedures.

6. Installer qualifications

7. Certification of Installer Training

8. Inspection Reports

9. Results of Anchor Proof Testing

10. For outdoor equipment, anchorage calculations to resist design wind loads, signed and sealed by a Professional Engineer registered in the State of Florida.

1.05 QUALITY ASSURANCE

A. Fasteners not manufactured in the United States shall be tested and certification provided with respect to specified quality and strength standards. Certifications of origin shall be submitted for all U.S. fasteners supplied on the project.

B. Installer Qualifications: Drilled-in anchors shall be installed by an Installer with at least three years of experience performing similar installations. Installer shall be certified as an Adhesive Anchor Installer in accordance with ACI-CRSI Adhesive Anchor Installation Certification Program.

C. Installer Training: Conduct a thorough training with the manufacturer or the manufacturer's representative for the Installer on the project. Training shall consist of a review of the complete installation process for drilled-in anchors, to include but not be limited to the following:

1. Hole drilling procedure.

2. Hole preparation and cleaning technique.

3. Adhesive injection technique and dispenser training/maintenance.

4. Rebar doweling preparation and installation.

5. Proof loading/torquing.

D. All steel welding shall be performed by welders certified in accordance with AWS D1.1. All stainless steel welding shall be performed by welders certified in accordance with AWS D1.6. Certifications of field welders shall be submitted prior to performing any field welds.

E. The Owner may engage an independent testing agency to perform testing of welded connections and to prepare test reports in accordance with AWS. Inadequate welds shall be corrected or redone and retested to the satisfaction of the Engineer and/or an acceptable independent testing laboratory, at no additional cost to the Owner.

F. Inspections of the adhesive dowel system shall be made by the Engineer or Owner representative in accordance with the requirements of the ESR published by the manufacturer. Provide adequate time and access for inspections of products and anchor holes prior to injections, installation, and proof testing.

PART 2 -- PRODUCTS

2.01 ANCHOR RODS (ANCHOR BOLTS)

A. For all conditions throughout this Contract, all anchor bolts shall be Type 316 stainless steel conforming to ASTM F-593 unless noted otherwise.

B. Nuts shall conform to ASTM F-594, alloy 316.

C. Where anchor rods are used to anchor galvanized steel or are otherwise specified to be galvanized, anchor rods and nuts shall be hot-dip galvanized. Galvanized anchor rods shall conform to ASTM F1554 Grade 36, and nuts shall conform to ASTM A563 Grade A.

D. Where pipe sleeves around anchor rods are shown on the Drawings, pipe sleeves shall be cut from Schedule 80 PVC plastic piping meeting the requirements of ASTM D1785, unless noted otherwise.

E. Equipment manufacturers, fabricators, and suppliers shall design and furnish anchor bolts as required to install the supplied units. The anchor bolt layout shall be coordinated with concrete work as specified herein.

F. Drilled in type anchor bolts, either adhesive types or mechanical types shall not be used unless approved in writing by the manufacturer/fabricator of equipment or covers, subject to acceptance by the Engineer. All operating pieces of equipment such as pumps, generators, motors etc. shall not be anchored with wedge anchors or other mechanical anchors. Drilled in type anchor bolts shall be Type 316 stainless steel. Drilled in type anchor bolts are specified under Article 2.04 of this Section entitled "Concrete Anchors".

2.02 STAINLESS STEEL BOLTS

A. Stainless steel bolts shall conform to ASTM F-593. All underwater fasteners, fasteners in confined areas containing fluid, and fasteners in corrosive environments shall be Type 316 stainless steel. Unless otherwise specified, fasteners for aluminum and stainless steel members shall be Type 316 stainless steel.

B. Stainless steel bolts shall have hexagonal heads with a raised letter or symbol on the bolts indicating the manufacturer, and shall be supplied with hexagonal nuts meeting the requirements of ASTM F594. Nuts shall be of the same alloy as the bolts.

2.03 CONCRETE ANCHORS

A. General

1. Where concrete anchors are called for on the Drawings, one of the types listed below shall be used; except, where one of the types listed below is specifically called for on the Drawings, only that type shall be used. Unless otherwise noted, all concrete anchors which are submerged, or are used in hanging items or have direct tension induced upon them, or which are subject to vibration from equipment such as pumps and generators, shall be adhesive anchors. The determination of anchors equivalent to those listed below shall be on the basis of test data

performed by an approved independant testing laboratory. There are two types used:

a. Expansion anchors shall be mechanical anchors of the wedge, sleeve, drop-in or undercut type.

b. Adhesive anchors shall consist of threaded rods or bolts anchored with an adhesive system into hardened concrete. Adhesive anchors shall be two part injection type using the manufacturer's static mixing nozzle and shall be supplied as an entire system.

2. Expansion anchors shall not be used to hang items from above or in any other situation where direct tension forces are induced in anchor.

3. Unless otherwise noted, all concrete anchors which are submerged or subject to water off-gassing, or are used in hanging items or have direct tension induced upon them, or which are subject to vibration from equipment such as pumps and generators, shall be adhesive anchors.

4. Adhesive anchors shall conform to the requirements of ACI 355.4 or alternately to AC308. Expansion or mechanical anchors shall conform to the requirements of ACI 355.2 or alternately to AC 193.

5. All anchors installed within fire resistant construction shall either be enclosed in a fire resistant envelope, be protected by approved fire-resistive materials, be used to resist wind loads only, or anchor non-structural elements.

B. Concrete Anchor Design

An anchor design consists of specifying anchor size, quantity, spacing, edge distance and embedment to resist all applicable loads. Where an anchor design is indicated on the Drawings, it shall be considered an engineered design and anchors shall be installed to the prescribed size, spacing, embedment depth and edge distance. If all parts of an anchor design are provided on the Drawings except embedment depth, the anchors will be considered an engineered design and the Contractor shall provide the embedment depth as indicated in Paragraph B.3 unless otherwise directed by the Engineer. Where an anchor design is not indicated by the Engineer on the Drawings, the Contractor shall provide the anchor design per the requirements listed below.

1. Structural Anchors: All concrete anchors shall be considered structural anchors if they transmit load between structural elements; transmit load between non-structural components that make up a portion of the structure and structural elements; or transmit load between life-safety related attachments and structural elements. Examples of structural concrete anchors include but are not limited to column anchor bolts, anchors supporting non-structural walls, sprinkler piping support anchors, anchors supporting heavy, suspended piping or equipment, anchors supporting barrier rails, etc. For structural anchors, the Contractor shall submit an engineered design with signed and sealed calculations performed by an Engineer currently registered in the State of Florida. Structural anchors shall be of a type recommended by the anchor manufacturer for use in cracked concrete and shall be designed by the Contractor in accordance with ACI 318 Appendix D.

2. Non-Structural Anchors: All other concrete anchors may be considered non-structural concrete anchors. The Contractor shall perform an engineered design for non-structural anchors. The Engineer may request the Contractor provide anchor design details for review, but submission of a signed, sealed design is not required. Non-structural anchors shall be designed by the contractor for use in uncracked concrete.

3. Minimum anchor embedment shall be as indicated on the Drawings or determined by the Contractor's engineered design. Concrete anchors shall be embedded no less than the manufacturer's standard embedment (expansion or mechanical anchors) or to provide a minimum allowable bond strength equal to the allowable yield capacity of the rod/bolt (adhesive anchors).

C. Structural Anchors:

1. Mechanical Anchors:

a. Wedge Anchors: Wedge anchors shall be "Kwik Bolt TZ" by Hilti, Inc., "TruBolt +" by ITW Redhead, "Strong-Bolt" or "Strong-Bolt 2" by Simpson Strong-Tie Co. or "Powerstud SD-1" or "Powerstud SD-2" by Powers Fasteners.

b. Screw Anchors: Screw anchors shall be "Kwik HUS-EZ" and "KWIK HUS-EZ-I" by Hilti, Inc., "Titen HD" by Simpson Strong-Tie Co., or "Wedge-Bolt +" by Powers Fasteners. Bits specifically provided by manufacturer of chosen system shall be used for installation of anchors.

c. Sleeve Anchors: Sleeve anchors shall be "HSL-3 Heavy Duty Sleeve Anchor" by Hilti, Inc. or "Power-Bolt +" by Powers Fasteners.

d. Undercut Anchors: Undercut anchors shall be "HDA Undercut Anchor" by Hilti, Inc., "Torq-Cut Undercut Anchor" by Simpson Strong-Tie Co., "Atomic + Undercut Anchor" by Powers Fasteners

2. Adhesive Anchors:

a. Adhesive anchors shall be "Epcon G5" by ITW Redhead, "HIT HY-150 Max SD" by Hilti, Inc., "SET-XP" by Simpson Strong-Tie Co., or "Powers 1000+" by Powers Fasteners.

b. Structural adhesive anchor systems shall be IBC compliant and capable of resisting short term wind and seismic loads (Seismic Design Categories A through F) as well as long term and short term sustained static loads in both cracked and uncracked concrete in all Seismic Design Categories. Structural adhesive anchor systems shall comply with the latest revision of ICC-ES Acceptance Criteria AC308, and shall have a valid ICC-ES report in accordance with the applicable building code. No or equal products will be considered unless prequalified and approved by the Engineer and Owner.

D. Non-Structural Anchors: In addition to the acceptable non-structural anchors listed below, all structural anchors listed above may also be used as non-structural anchors.

1. Mechanical Anchors:

a. Wedge Anchors: Wedge anchors shall be “Kwik Bolt 3” by Hilti, Inc. or “TruBolt” by ITW Redhead.

b. Screw Anchors: Screw anchors shall be “Kwik HUS” by Hilti, Inc., “Wedge-Bolt” by Powers Fasteners or “Large Diameter Tapcon (LDT) Anchor” by ITW Redhead. Bits specifically provided by manufacturer of chosen system shall be used for installation of anchors.

c. Sleeve Anchors: Sleeve anchors shall be “HSL Heavy Duty Sleeve Anchors” by Hilti, Inc. “Power-Bolt” by Powers Fasteners or “Dynabolt Sleeve Anchor” by ITW Redhead.

d. Drop-In Anchors: Drop-in anchors shall be “Drop-In” by Simpson Strong-Tie Co., “HDI Drop-In Anchor” by Hilti, Inc. or “Multi-Set II Drop-In Anchor” by ITW Redhead.

e. Undercut Anchors: Undercut anchors shall be “HDA Undercut Anchor” by Hilti, Inc.

2. Adhesive Anchors:

a. Adhesive anchors shall be “Epcon A7” or “Epcon C6” by ITW Redhead, “HIT HY-150 Max” by Hilti, Inc., “SET Epoxy Tie” or “AT” by Simpson Strong-Tie Co., or “Powers AC 100+ Gold” or “T308+ Epoxy” by Powers Fasteners.

b. Non-structural adhesive anchors systems shall be IBC compliant and capable of resisting short term wind and seismic (Seismic Design Categories A and B) as well as long term and short term sustained static loads in uncracked concrete

c. Non-structural adhesive anchor embedment depth of the rod/bolt shall provide a minimum allowable bond strength that is equal to the allowable yield capacity of the rod/bolt unless noted otherwise on the Drawings.

d. No or equal products will be considered unless prequalified and approved by the Engineer and Owner.

E. Concrete Anchor Rod/Bolt Materials:

1. Concrete anchors used to anchor structural steel shall be a threaded steel rod per manufacturer’s recommendations for proposed adhesive system, but shall not have a yield strength (fy) less than 58 ksi nor an ultimate strength (fu) less than 72.5 ksi, unless noted otherwise. Where steel to be anchored is galvanized,

concrete anchors shall also be galvanized unless otherwise indicated on the Drawings.

2. Concrete anchors used to anchor aluminum, FRP, or stainless steel shall be Type 304 stainless steel unless noted otherwise. All underwater concrete anchors shall be Type 316 stainless steel.

3. Nuts, washers, and other hardware shall be of a material to match the anchors.

2.04 ANTISEIZE LUBRICANT

A. Antiseize lubricant shall be Graphite 50 Anti-Seize by Loctite Corporation, 1000 Anti-Seize Paste by Dow Corning, 3M Lube and Anti-Seize by 3M, or equal.

PART 3 -- EXECUTION

3.01 MEASUREMENTS

A. The Contractor shall verify all dimensions and review the Drawings and shall report any discrepancies to the Engineer for clarification prior to starting fabrication.

3.02 ANCHOR INSTALLATION

A. Anchor Rods

1. Anchor rods shall be installed in accordance with AISC "Code of Standard Practice" by setting in concrete while it is being placed and positioned by means of a rigidly held template. Overhead adhesive anchors, and base plates or elements they are anchoring, shall be shored as required and securely held in place during anchor setting to prevent movement during anchor installation. Movement of anchors during curing is prohibited.

2. The Contractor shall verify that all concrete and masonry anchors have been installed in accordance with the manufacturer's recommendations and that the capacity of the installed anchor meets or exceeds the specified safe holding capacity.

3. Concrete anchors shall not be used in place of anchor rods without Engineer's approval.

4. All stainless steel threads shall be coated with antiseize lubricant.

B. Concrete Anchors

1. Concrete at time of anchor installation shall be a minimum age of 21 days.

2. Concrete anchors designed by the Contractor shall be classified as structural or non-structural based on the requirements indicated above.

3. Concrete Anchor Testing:

   a. At all locations where concrete anchors meet the requirements for structural anchors at least 25 percent of all concrete anchors installed shall be proof tested to the value indicated on the Drawings, with a minimum of one tested anchor per anchor group. If no test value is indicated on the Drawings but the installed anchor meets the requirements for structural anchors, the Contractor shall notify the Engineer to allow verification of whether anchor load proof testing is required.

   b. Contractor shall submit a plan and schedule indicating locations of anchors to be tested, load test values and proposed anchor testing procedure (including a diagram of the testing equipment proposed for use) to the Engineer for review prior to conducting any testing. Testing of anchors shall be in accordance with ASTM E488 for the static tension test. If additional tests are required, inclusion of these tests shall be as stipulated on Contract Drawings.

   c. Where Contract Documents indicate anchorage design to be the Contractor's responsibility and the anchors are considered structural per the above criteria, the Contractor shall submit a plan and schedule indicating locations of anchors to be proof tested and load test values, sealed by a Professional Engineer currently registered in the State of Florida. The Contractor's Engineer shall also submit documentation indicating the Contractor's testing procedures have been reviewed and the proposed procedures are acceptable. Testing procedures shall be in accordance with ASTM E488.

   d. Concrete Anchors shall have no visible indications of displacement or damage during or after the proof test. Concrete cracking in the vicinity of the anchor after loading shall be considered a failure. Anchors exhibiting damage shall be removed and replaced. If more than 5 percent of tested anchors fail, then 100 percent of anchors shall be proof tested.

   e. Proof testing of concrete anchors shall be performed by an independent testing laboratory hired directly by the Contractor and approved by the Engineer. The Contractor shall be responsible for costs of all testing, including additional testing required due to previously failed tests.

4. All concrete anchors shall be installed in strict conformance with the manufacturer's printed installation instructions. A representative of the manufacturer shall be on site when required by the Engineer.

5. All holes shall be drilled with a carbide bit unless otherwise recommended by the manufacturer. No cored holes shall be allowed unless specifically approved by the Engineer. If coring holes is allowed by the manufacturer and approved by the Engineer, cored holes shall be roughened in accordance with manufacturer requirements. Thoroughly clean drill holes of all debris and drill dust with compressed air followed by a wire brush prior to installation of adhesive and threaded rod/bolt unless otherwise recommended by the manufacturer. Degree of hole dampness shall be in strict accordance with manufacturer recommendations.

Where depth of hole exceeds the length of the static mixing nozzle, a plastic extension hose shall be used to ensure proper adhesive injection from the back of the hole. Injection of adhesive into the hole shall utilize a piston plug to minimize the formation of air pockets. Wipe rod free from oil that may be present from shipping or handling.

3.03 INSPECTION

A. High strength bolting will be visually inspected in accordance with AISC 348 "The 2009 RCSC Specification for Structural Joints". Rejected bolts shall be either replaced or retightened as required. In cases of disputed bolt installation, the bolts in question shall be checked by a calibrated wrench certified by an independent testing laboratory. The certification shall be at the Contractor's expense.

B. Field welds will be visually inspected in accordance with AWS Codes. Inadequate welds shall be corrected or redone as required in accordance with AWS Codes.

C. Post installed anchors shall be inspected as required by ACI 318.

3.04 CUTTING OF EMBEDDED REBAR

A. The Contractor shall not cut embedded rebar cast into structural concrete during installation of post-installed fasteners without prior approval of the Engineer.

- END OF SECTION –

SECTION 05500

METAL FABRICATIONS

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish, fabricate, and install miscellaneous metalwork and appurtenances, complete, all in accordance with the requirements of the Contract Documents.

1.02 SUBMITTALS

A. Shop drawings of all miscellaneous metalwork shall be submitted to the Engineer for review in accordance with the Section 01300 entitled "Submittals."

B. Safe working load capacity in tension and shear for each size and type of concrete anchor used shall be submitted to the Engineer for review.

PART 2 -- PRODUCTS

2.01 METAL MATERIALS

A. Materials are specified in Section 05010 entitled "Metal Materials".

2.02 BOLTS, CONCRETE ANCHORS AND FASTENERS

A. Bolts, concrete anchors and other fasteners are specified in Section 05050 entitled "Metal Fastening".

PART 3 -- EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Beginning of installation means erector accepts existing conditions.

3.02 PREPARATION

A. Clean and strip primed steel items to bare metals where site welding is required.

B. Supply items required to be cast into concrete with setting templates, to appropriate sections.

3.03 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Field weld components indicated on Drawings.

D. Obtain Engineer approval prior to site cutting or making adjustments not scheduled.

E. Fabrication and Erection: Except as otherwise shown, the fabrication and erection of structural steel shall conform to the requirements of the American Institute of Steel Construction "Manual of Steel Construction."

3.04 WELDING

A. All welding shall be by the metal-arc method or gas-shielded arc method as described in the American Welding Society's "Welding Handbook" as supplemented by other pertinent standards of the AWS. Qualification of welders shall be in accordance with the AWS Standards governing same.

B. In assembly and during welding, the component parts shall be adequately clamped, supported and restrained to minimize distortion and for control of dimensions. Weld reinforcement shall be as specified by the AWS Code. Upon completion of welding, all weld splatter, flux, slag, and burrs left by attachments shall be removed. Welds shall be repaired to produce a workmanlike appearance, with uniform weld contours and dimensions. All sharp comers of material which is to be painted or coated shall be ground to a minimum of 1/32-inch on the flat.

- END OF SECTION -

SECTION 09900

PAINTING

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish all labor, tools, materials, supervision and equipment necessary to do all the work specified herein and as required for a complete installation.

1.02 GENERAL INFORMATION AND DESCRIPTION

A. The term "paint," as used herein, includes emulsions, enamels, paints, stains, varnishes, sealers, cement filler, cement-latex filler and other coatings, whether used as prime, intermediate, or finish coats.

B. All paint for concrete and metal surfaces shall be especially adapted for use around wastewater treatment plants and shall be applied in conformance with the Manufacturer's published specifications.

C. All paint for final coats shall be fume resistant, compounded with pigments suitable for exposure to sewage gases, especially to hydrogen sulfide and to carbon dioxide. Pigments shall be materials which do not tend to darken, discolor, or fade due to the action of sewage gases. If a paint Manufacturer proposes use of paint which is not designated "fume resistant" in its literature, it shall furnish full information concerning the pigments used in this paint.

D. All building, facilities, structures, and appurtenances, as indicated on the Drawings and as specified herein, shall be painted with not less than one shop coat and two field coats, or one prime coat and two finish coats of the appropriate paint. Items to be painted include, but are not limited to, exterior and interior concrete, structural steel, miscellaneous metals, steel and aluminum doors and frames, concrete block, ductwork, sluice gates, operators, pipe fittings, valves, mechanical equipment, motors, conduit, and all other work which is obviously required to be painted unless otherwise specified.

E. Baked-on enamel finishes and items with standard shop finishes such as electrical or instrumentation equipment shall not be field painted unless the finish is damaged during shipment or installation. Aluminum, stainless steel, fiberglass and bronze work shall not be painted unless color coding and marking is required or otherwise specified. A list of surfaces not to be coated is included in Article 1.09 of this Section.

F. The Contractor shall obtain all permits, licenses and inspections and shall comply with all laws, codes, ordinances, rules and regulations promulgated by authorities having jurisdiction which may bear on the work. This compliance will include Federal Public Law 91-596 more commonly known as the "Occupational Safety and Health Act of 1970".

1.03 MANUFACTURERS

A. All painting materials shall be as manufactured by Tnemec, Carboline, Ameron, DuPont, Sherwin Williams, International, or approved equal.

1.04 SUBMITTALS

A. The Contractor shall submit paint Manufacturer's data sheets, application instructions, and samples of each finish and color to the Engineer for review, before any work is started in accordance with Section 01300 entitled, "Submittals."

B. Submitted samples of each finish and color shall be prepared so that the area of each sample indicates the appearance of the various coats. For example, where a three-coat system is specified, the sample shall be divided into three areas indicating one coat only, two coats and all three coats. The Engineer will provide written authorization constituting a standard, as to color and finish only, for each coating system.

C. The Contractor shall prepare a complete schedule of surfaces to be coated and shall identify the surface preparation and paint system he proposes to use. The Paint Schedule shall be in conformance with Article 3.03 of this Section. The schedule shall contain the name of the paint Manufacturer, and the name, address and telephone number of the Manufacturer's representative that will inspect the Work. The schedule shall be submitted to the Engineer for review as soon as possible following the Notice to Proceed so that the schedule may be used to identify colors and to specify shop painting systems on order for fabricated equipment.

1.05 SERVICES OF MANUFACTURER'S REPRESENTATIVE

A. The Contractor shall purchase paint from an acceptable Manufacturer. The Manufacturer shall assign a representative to inspect the application of his product both in the shop and field. The Contractor, through the Manufacturer's representative, shall submit his report to the Engineer at the completion of his Work identifying the products used and verifying that said products were properly applied and that the paint systems were proper for the exposure and service.

B. Services shall also include, but not be limited to, inspecting prior coatings of paint, determination of best means of surface preparation, inspection of complete work, and re-inspection of painted work to be performed six months after the job is completed.

1.06 MANUFACTURER'S INSTRUCTIONS

A. The Manufacturer's published instructions for use as a guide in specifying and applying the Manufacturers proposed paint shall be submitted to the Engineer. Paint shall not be delivered to the job before acceptance of the Manufacturer's instructions is given by the Engineer.

B. A Manufacturer's paint will not be considered for use unless that Manufacturer's published instructions meets the following requirements:

1. The instructions must have been written and published by the Manufacturer for the purpose and with the intent of giving complete instruction for the use and application of the proposed paint in the locality and for the conditions for which the paint is specified or shown to be applied under this Contract.

2. All limitations, precautions, and requirements that may adversely affect the paint; that may cause unsatisfactory results after the painting application; or that may cause the paint not to serve the purpose for which it was intended; that is, to protect the covered material from corrosion, shall be clearly and completely stated in the instructions. These limitations and requirements shall, if they exist, include, but not be limited to the following:

   a. Methods of application

   b. Number of coats

   c. Thickness of each coat

   d. Total thickness

   e. Drying time of each coat, including primer

   f. Primer required to be used

   g. Primers not permitted

   h. Use of a primer

   I. Thinner and use of thinner

   j. Temperature and relative humidity limitations during application and after application

   k. Time allowed between coats

   l. Protection from sun

   m. Physical properties of paint including solids content and ingredient analysis

   n. Surface preparation

   o. Touch up requirements and limitations

C. Concrete surfaces specified by the paint Manufacturer to be acid etched shall be etched in accordance with the Manufacturer's instructions. The surface shall then be thoroughly scrubbed with clean water, rinsed, and allowed to dry. The surface shall be tested with a moisture meter to determine when dry before coating.

1.07 QUALITY ASSURANCE

A. The Contractor shall give the Engineer a minimum of three days advance notice of the start of any field surface preparation work of coating application work.

B. All such Work shall be performed only in the presence of the Engineer, unless the Engineer has specifically allowed the performance of such Work in his absence.

C. Review by the Engineer, or the waiver of review of any particular portion of the Work, shall not relieve the Contractor of his responsibility to perform the Work in accordance with these Specifications.

1.08 SAFETY AND HEALTH REQUIREMENTS

A. In accordance with requirements of OSHA Safety and Health Standards for Construction (29CFR1926) and the applicable requirements of regulatory agencies having jurisdiction, as well as Manufacturer's printed instructions, appropriate technical bulletins, manuals, and material safety data sheets, the Contractor shall provide and require use of personnel protective and safety equipment for persons working in or about the project site.

B. Respirators shall be worn by persons engaged or assisting in spray painting. The Contractor shall provide ventilating equipment and all necessary safety equipment for the protection of the workmen and the work.

C. All paints must comply with the requirements of the National Ambient Air Quality Standards and the Air Pollution Regulatory Acts concerning the application and formulation of paints and coatings for an area in which the paints are applied. Specifically, paints shall be reformulated as required to meet the local, State and Federal requirements.

1.09 SURFACES NOT TO BE COATED

A. The following items shall not be coated unless otherwise noted:

1. Stainless steel work.
2. Flexible couplings, lubricated bearing surfaces and insulation.
3. Packing glands and other adjustable parts of mechanical equipment.
4. Finish hardware.
5. Plastic switch plates and receptacle plates.
6. Signs, nameplates, serial numbers, and operating instruction labels.
7. Any code-requiring labels, such as Underwriters' Laboratories and Factory Mutual, or any equipment identification, performance rating, name or nomenclature plates.
8. Any moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sinkages, sensing devices, motor and fan shafts, unless otherwise indicated.

1.10 QUALITY WORKMANSHIP

A. The Contractor shall be responsible for the cleanliness of his painting operations and shall use covers and masking tape to protect the work whenever such covering is necessary, or if so requested by the Owner. Any unwanted paint shall be carefully removed without damage to any finished paint or surface. If damage does occur, the entire surface, adjacent to and including the damaged area, shall be repainted without visible lapmarks and without additional cost to the Owner.

B. Painting found defective shall be scraped or sandblasted off and repainted as the OWNER may direct. Before final acceptance of the work, damaged surfaces of paint shall be cleaned and repainted as directed by the Owner.

C. Any pipe scheduled to be painted and having received a coating of a tar or asphalt compound shall be painted with two coats or "Inertol Tar Stop", "Tnemec Tar Bar" or equal before successive coats are applied in accordance with the paint schedule.

1.11 ADDITIONAL PAINT

A. At the end of the project, the Contractor shall turn over to the Owner a gallon can of each type and color of paint, primer, thinner or other coating used in the field painting. If the Manufacturer packages the material concerned in gallon cans, then it shall be delivered in unopened labeled cans as it comes from the factory. If the Manufacturer does not package the material in gallon cans, and in the case of special colors, the materials shall be delivered in new gallon containers, properly closed with type labels indicating brand, type, color, etc. The Manufacturer's literature described the materials and giving directions for their use shall be furnished in three bound copies. A type-written inventory list shall be furnished at the time of delivery.

1.12 SHIPPING, HANDLING AND STORAGE

A. All painting materials shall be brought to the job site in the original sealed labeled containers of the paint Manufacturer and shall be subject to review by the Engineer. Where thinning is necessary, only the product of the Manufacturer furnishing the paint shall be used. All such thinning shall be done strictly in accordance with the Manufacturer's instructions, and with the full knowledge of the Engineer.

B. Materials and their storage shall be in full compliance with the requirements of pertinent codes and fire regulations. Receptacles shall be placed outside buildings for paint gates and containers. Paint waste shall not be disposed of in plumbing fixtures, process drains or other plant systems or process units.

PART 2 -- PRODUCTS

2.01 MATERIALS

A. Table 09900-1 depicts the coatings referenced in Article 3.03 of this Section entitled, "Paint Schedule". Table 09900-1 lists Tnemec products as a reference. Equivalent products by the Manufacturers listed in Article 1.03 of this Section may be submitted for review.

TABLE 09900-1
PRODUCT LISTING

Ref. No.	Description	Manufacturer's Reference Tnemec
103	Modified Polyamidoamine Epoxy	135 – Color
104	Polyamidoamine Epoxy Primer	N69 – 1211
105	Polyamidoamine Epoxy	N69 – Color
110	Aliphatic Acrylic Polyurethane	73 – Color
111	Modified Waterborne Acrylate	156 - Envirocrete (Smooth Texture)
114	Acrylic	6
115	Aromatic Urethane, Zinc Rich	90-97

PART 3 -- EXECUTION

3.01 SURFACE PREPARATION

A. Surfaces to be painted shall be clean and dry, and free of dust, rust, scale and all foreign matter. No solvent cleaning, power or hand tool cleaning shall be permitted unless acceptable to the Engineer or specified herein.

B. Except as otherwise provided, all preparation of metal surfaces shall be in accordance with Specifications SP-1 through SP-10 of the Steel Structures Painting Council (SSPC). Where Steel Structures Painting Specifications are referred to in these Contract Documents, the corresponding Pictorial Surfaces Preparation Standard shall be used to define the minimum final surface conditions to be supplied. Grease and oil shall be removed and the surface prepared by hand tool cleaning, power tool cleaning or blast cleaning in accordance with the appropriate Specification SP-1 through SP-10.

C. Weld flux, weld spatter and excessive rust scale shall be removed by power tool cleaning as per SSPC-SP-3-63.

D. Threaded portions of valve and gate stems, machined surfaces which are limited for sliding contact, surfaces which are to be assembled against gaskets, surfaces or shafting on which sprockets are to fit, or which are intended to fit into bearings, machined surfaces of bronze trim on slide gates and similar surfaces shall be masked off to protect them from the sandblasting of adjacent surfaces. Cadmium-plated or galvanized items shall not be sandblasted unless hereinafter specified, except that cadmium-plated, zinc-plated, or sherardized fasteners used in assembly of equipment to the sandblasted shall be sandblasted in the same manner as the unprotected metal. All installed equipment, mechanical drives, and adjacent painted equipment shall be protected from sandblasting. Protection shall prevent any sand or dust from entering the mechanical drive units or equipment where damage could be caused.

E. Hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place prior to cleaning and painting, and not intended to be painted, shall be protected or

removed during painting operations and repositioned upon completion of painting operations.

F. Any abraded areas of shop or field applied coating shall be touched up with the same type of shop or field applied coating, even to the extent of applying an entire coating, if necessary. Touch-up coating and surface preparations shall be in addition to and not considered as the first field coat.

G. Sand from sandblasting shall be thoroughly removed, using a vacuum cleaner if necessary. No surface which has been sandblasted shall be painted until inspected by the Engineer.

H. Exposed Pipe

1. Bituminous coated pipe shall not be used in exposed locations. Pipe which shall be exposed after project completion shall be primed in accordance with the requirements herein. Any bituminous coated ferrous pipe which is inadvertently installed in exposed locations shall be sandblasted to SSPC-SP-5 White Metal before priming and painting.

2. After installation and prior to finish painting, all exterior, exposed flanged joints shall have the gap between adjoining flanges and gaps between the pipe wall and threaded-on flanges sealed with a single component Thiokol caulking to prevent rust stains.

I. Ferrous Metal Surfaces

1. All ferrous metal surfaces not required to be galvanized shall be cleaned of all oil grease, dirt, rust and tight and loose mill scale by blasting in accordance with the following: SSPC-SP-5, White Metal Blast Cleaning and comply with the visual standard NACE 1, for submerged metal. SSPC-SP-10 Near White Metal Blast Cleaning, and comply with the visual standard NACE 2 for all other locations. Pickling, complying with SSPC-SP-8, may be substituted for Near White Blast in areas as determined by the Engineer. Priming shall follow sandblasting before any evidence of corrosion occurs, before nightfall and before any moisture is on the surface.

2. Existing painted ferrous metal surfaces shall be cleaned of all oil, grease and dirt by blasting with a minimum 2,500 psi high pressure blast. All rust shall be removed in accordance with SSPC-SP-3 and spot primed with the applicable primer.

J. Field surface preparation of small, isolated areas such as field welds, repair of scratches, abrasions or other marks to the shop prime or finish shall be cleaned by power tools in accordance with SSPC-SP-3, or in difficult and otherwise inaccessible areas by hand cleaning in accordance with SSPC-SP-2 and spot primed.

K. Primed or Coated Surfaces and Non-Ferrous Surfaces

1. All coated surfaces shall be cleaned prior to application of successive coats. All non-ferrous metals not to be coated shall be cleaned. This cleaning shall be done

in accordance with SSPC-SP-1, Solvent Cleaning.

L. Shop Finished Surfaces

1. All shop-coated surfaces shall be protected from damage and corrosion before and after installation by treating damaged areas immediately upon detection. Abraded or corroded spots on shop-coated surfaces shall be prepared in accordance with SSPC-SP-2, Hand Tool Cleaning and then touched up with the same materials as the shop coat.

2. All shop coated surfaces which are faded, discolored, or which require more than minor touch-up, in the opinion of the Engineer, shall be repainted. Cut edges of galvanized sheets, electrical conduit, and metal pipe sleeves, not to be finish painted, shall be cleaned in accordance with SSPC-SP-1, Solvent Cleaning and primed with zinc dust-zinc oxide metal primer.

M. Concrete Surfaces

1. Concrete surfaces to be painted shall be prepared by removing efflorescence, chalk, dust, dirt, grease, oil, form coating, tar and by roughening to remove glaze. All surfaces shall be repaired prior to commencement of the coating operation.

2. Concrete surfaces are to be cured for at least 28 days prior to coating them.

N. New concrete immersion surfaces that are to be coated shall be brush blasted per SSPC-SP7 to produce the necessary "sandpaper texture" surface required for satisfactory adherence of the paint. Areas of concrete, which contain blow holes or voids, shall be filled with the Manufacturer's approved filler material.

O. Existing Painted Concrete Surfaces

1. Existing painted concrete surfaces requiring paint as identified herein shall be prepared by applying a minimum 2500 psi high pressure water blast to the existing painted surface to remove all loose paint, chalk, dust, dirt, grease, oil, latents, and other foreign materials. Cracks, chips or voids in the existing concrete shall be repaired in accordance with paint Manufacturer recommendations.

3.02 SHOP PAINTING

A. All fabricated steel work and equipment shall receive at the factory at least one shop coat of prime paint compatible with the paint system required by these Specifications. The Contractor shall coordinate all shop priming to ensure compatibility with paint system specified. Surface preparation prior to shop painting shall be as specified. Finish coats may be applied in the shop if acceptable to the Engineer. All shop painted items shall be properly packaged and stored until they are incorporated in the Work. Any painted surfaces that are damaged during handling, transporting, storage or installation shall be cleaned, scraped, and patched before field painting begins so that Work shall be equal to the original painting received at the shop. Equipment or steel Work that is to be assembled on the site shall likewise receive a minimum of one shop coat of paint at the factory.

Surfaces of exposed members that will be inaccessible after erection shall be prepared and painted before erection.

B. The Contractor shall specify the shop paints to be applied when ordering equipment in order to assure compatibility of shop paints with field paints. The paints and surface preparation used for shop coating shall be identified on shop drawings submitted to the Engineer for review. Shop paint shop drawings will not be reviewed until the final project paint system has been submitted by the Contractor and reviewed by the Engineer.

C. Shop finish coats may be the standard finish as ordinarily applied by the Manufacturer if it can be demonstrated to the Engineer that the paint system is equal to and compatible with the paint system specified. However, all pumps, motors and other equipment shall receive at least one field applied finish coat after installation.

3.03 PAINT SCHEDULE

A. The Contractor shall adhere to this paint schedule, providing those paints named or equal. DFT shall mean the minimum dry film thickness per application measured in mils. Products are referenced by numbers listed in Article 2.01 of this Section entitled "Product Listing." The paint schedule identifies the minimum DFT required per coat. If the Contractor does not achieve the specified DFT range in a single coat, he shall provide additional coats as necessary at no additional cost to the Owner.

B. Metal Surfaces, Atmospheric (Exterior) Exposure

1. Metal surfaces exposed to the atmosphere that do not come into contact with wastewater or corrosive atmosphere including the following types of surfaces shall be painted as described below:

   a. Pumps, motors, process equipment, machinery, etc.

   b. Above ground piping, valves and pipe supports.

   c. Miscellaneous steel shapes, angles, etc.

   d. Exposed surfaces of conduit, ductwork, etc.

Ferrous Metal

Application	No.	Description	DFT
First -1 coat	104	Hi-Build Epoxoline II Primer	3.0 - 5.0
Second - 1 coat	105	Hi-Build Epoxoline II	2.0 - 3.0
Finish - 1 coat	110	Endura Shield III	2.0 - 3.0
		Min. Total	9.0 Mils

Non-Ferrous Metal

Application	No.	Description	DFT
First - 1 coat	105	Hi-Build Epoxoline II	2.0 - 3.0
Second - 1 coat	110	Endura Shield III	2.0 - 3.0
		Min. Total	5.0 Mils

Galvanized

Application	No.	Description	DFT
Spot Repair	115	Aromatic Urethane, Zinc-Rich (spot)	2.0 - 3.0
First - 1 coat	105	Hi-Build Epoxoline II	2.0 - 3.0
Second - 1 coat	110	Endura Shield III	2.0 - 3.0
		Min. Total	5.0 Mils

C. Ductile Iron Pipe, Exterior or Interior Exposure

1. Ductile iron pipe exterior or interior exposure shall receive the following types of paint:

Application	No.	Description	DFT
First - 1 coat	105	Hi-Build Epoxoline II	6.0 - 10.0
Finish - 1 coat	110	Endura Shield III	3.0 - 5.0
		Min. Total	12.0 Mils

D. Existing Concrete, Stucco and Masonry Surfaces requiring Touch-Up caused by Contractor's Construction Activities, Exterior Exposure

1. Exteriors of existing structures shall be painted as identified herein. Paint colors and color scheme shall match existing.

Application	No.	Description	DFT
First - 1 coat	114	Waterborne Polyamide Epoxy	1.0 - 2.5
Brush - 1 coat*	111	Modified Waterborne Acrylate	4.0 - 6.0
Finish - 1 coat	111	Modified Waterborne Acrylate	4.0 - 6.0
		Min. Total	10.0 Mils

**(Apply a brush coat of TNEMEC Series 156 Enviro-Crete into all exposed cracks prior to application of finish coat.)*

E. Existing Painted Exterior and Interior Pumps, Equipment, Piping, Valves, Fittings and Supports Requiring Touch-Up Caused by Contractor's Construction Activities.

1. Existing painted exterior and interior piping, pumps, valves, fittings, supports, shall be painted as described below:

Application	No.	Description	DFT
First - 1 coat	103	Epoxy Mastic	3.0 - 5.0
Finish - 1 coat	110	Endura Shield III	2.0 - 3.0
		Minimum Total	8.0 Mils

3.04 INSPECTION OF SURFACES

A. Before application of the prime coat and each succeeding coat, all surfaces to be painted shall be subject to inspection by the ENGINEER. Any defects or deficiencies shall be corrected by the CONTRACTOR before application of any subsequent coating.

B. Samples of surface preparation and of painting systems shall be furnished by the CONTRACTOR to be used as a standard throughout the job, unless omitted by the ENGINEER.

C. When any appreciable time has elapsed between coatings, previously coated areas shall be carefully inspected by the ENGINEER, and where, in his opinion, surfaces are damaged or contaminated, they shall be cleaned and recoated at the CONTRACTOR's expense. Recoating times of manufacturer's printed instructions shall be adhered to.

3.05 EQUIPMENT

A. Effective oil and water separators shall be used in all compressed air lines serving spray painting and sandblasting operations to remove oil or moisture from the air before it is used. Separators shall be placed as far as practicable from the compressor.

B. All equipment for application of the paint and the completion of the work shall be furnished by the CONTRACTOR in first-class condition and shall comply with recommendations of the paint manufacturer.

3.06 PREPARATION OF MATERIALS

A. Mechanical mixers, capable of thoroughly mixing the pigment and vehicle together, shall mix the paint prior to use where required by manufacturer's instructions; thorough hand mixing will be allowed for small amounts up to five gallons.

B. Pressure pots shall be equipped with mechanical mixers to keep the pigment in suspension, when required by manufacturer's instructions. Otherwise, intermittent hand mixing shall be done to assure that no separation occurs. All mixing shall be done in accordance with SSPC Vol. 1, Chapter 4, "Practical Aspects, Use and Application of Paints" and/or with manufacturer's recommendations.

C. Catalysts or thinners shall be as recommended by the manufacturer and shall be added or discarded strictly in accordance with the manufacturer's instruction.

3.07 PAINTING

A. All paint shall be applied by experienced painters with brushes or other applicators acceptable to the Engineer.

B. Paint shall be applied without runs, sags, thin spots, or unacceptable marks. Paints shall be applied at the rate specified by the Manufacturer to achieve the minimum dry mil thickness required. Additional coats of paint shall be applied, if necessary, to obtain thickness specified.

C. Paint shall be applied with spraying equipment only on those surfaces approved by the Engineer. If the material has thickened or must be diluted for application by spray gun, each coat shall be built up to the same film thickness achieved with undiluted brushed-on material. Where thinning is necessary, only the products of the particular Manufacturer furnishing the paint shall be used; and all such thinning shall be done in strict accordance with the Manufacturer's instructions, as well as with the full knowledge of the Engineer.

D. Surfaces not accessible to brushes or rollers may be painted by spray by dauber or sheepskins and paint mitt. If any of these methods is to be used, it shall be done in strict accordance with the Manufacturer's instructions, as well as with the full knowledge of the Engineer.

E. Drying Time

1. A minimum of twenty-four hours drying time shall elapse between applications of any two coats of paint on a particular surface unless shorter time periods are a requirement of the Manufacturer or specified herein. Longer drying times shall be required for abnormal conditions as defined by the Manufacturer.

F. Weather Restrictions

1. No painting whatsoever shall be accomplished in rainy or excessively damp weather when the relative humidity exceeds 85 percent, or when the general air temperature cannot be maintained at 50 degrees Fahrenheit or above throughout the entire drying period. No paint shall be applied when it is expected that the relative humidity will exceed 85 percent or that the air temperature will drop below 50 degrees Fahrenheit within 18 hours after the application of the paint.

2. Dew or moisture condensation should be anticipated; and if such conditions are prevalent, painting shall be delayed until midmorning to be certain the surfaces are dry. The day's painting shall be completed well in advance of the probable time-of-day when condensation will occur.

G. Inspection of Surfaces

1. Each and every field coat of priming and finishing paint shall be inspected by the Engineer or his authorized representative before the succeeding coat is applied.

The Contractor shall follow a system of tinting successive paint coats so that no two coats for a given surface are exactly the same color. Areas to receive black protective coatings shall in such cases be tick-marked with white or actually gauged as to thickness when finished.

H. Before application of the prime coat and each succeeding coat, any defects or deficiencies in the prime coat or succeeding coat shall be corrected by the Contractor before application of any subsequent coating.

I. Samples of surface preparation and of painting systems shall be furnished by the Contractor to be used as a standard throughout the job, unless omitted by the Engineer.

J. When any appreciable time has elapsed between coatings, previously coated areas shall be carefully inspected by the Engineer, and where, in his opinion, surfaces are damaged or contaminated, they shall be cleaned and recoated at the Contractor's expense. Recoating times of Manufacturer's printed instructions shall be adhered to.

K. Coating thickness shall be determined by the use of a properly calibrated "Nordson-Mikrotest" (or equal) dry mil thickness gauge.

L. The Contractor shall provide free of charge to the Engineer two new "Nordson-Mikrotest" dry film gauges to be used to inspect coating by Engineer and Contractor. One gauge may be used by Contractor and returned each day to the Engineer. Engineer will return gauges to Contractor at completion of job.

M. Special Areas

1. All surfaces which are to be installed against concrete, masonry etc., and will not be accessible for field priming and/or painting shall be back primed and painted as specified herein, before erection. Anchor bolts shall be painted before the erection of equipment and then the accessible surfaces repainted when the equipment is painted.

N. Special attention shall be given to insure that edges, corners, crevices, welds and rivets receive a film thickness equivalent to that of the adjacent painted surfaces.

O. Safety

1. Respirators shall be worn by persons engaged or assisting in spray painting. The Contractor shall provide ventilating equipment and all necessary safety equipment for the protection of the workmen and the Work.

P. Quality Workmanship

1. The Contractor shall be responsible for the cleanliness of his painting operations and shall use covers and masking tape to protect the Work whenever such covering is necessary, or if so requested by the Owner. Any unwanted paint shall be carefully removed without damage to any finished paint or surface. If damage does occur, the entire surface, adjacent to and including the damaged area, shall be repainted without visible lap marks and without additional cost to the Owner.

Q. Painting found defective shall be scraped or sandblasted off and repainted as the Engineer may direct. Before final acceptance of the Work, damaged surfaces of paint shall be cleaned and repainted as directed by the Engineer.

R. Any pipe scheduled to be painted and having received a coating of a tar or asphalt compound shall be painted with two coats or "Intertol Tar Stop", "Tnemec Tar Bar" or equal before successive coats are applied in accordance with the paint schedule.

3.08 SCHEDULE OF COLORS

A. All colors shall be as designated by the Engineer at the shop drawing review. The Contractor shall submit color samples including custom color choices as required to the Engineer as specified in Article 1.04 of this Section. The Contractor shall submit suitable samples of all colors and finishes for the surfaces to be painted, or on portable surfaces when required by the Engineer. The Engineer shall decide upon the choice of colors and other finishes when alternates exist. No variation shall be made in colors without the acceptance from the Owner. Color names and/or numbers shall be identified according to the appropriate color chart issued by the Manufacturer of the particular product in question.

3.09 COLOR CODING AND LETTERING OF PIPING

A. The Contractor shall paint all piping, valves, equipment, exposed conduits and all appurtenances which are integral to a complete functional mechanical pipe and electrical conduit system, in accordance with Table 09900-2 entitled "Pipe Color Coding Schedule". Where colors are not designated for piping and conduit systems they will be selected during the shop drawing review from the paint Manufacturer's standard color charts.

B. In general, the pumps and equipment shall be painted the same color as the piping system to which it is connected unless otherwise directed by the Engineer. Where colors are not designated for piping and conduit systems they will be selected during the shop drawing review from the paint Manufacturer's standard color charts.

C. Lettering of Piping

1. The Contractor shall apply identification titles and arrows indicating the direction of flow of liquids to all types and sections of all new and existing plant piping. Titles shall be as directed by the Engineer. Identification titles shall be located midway between color coding bands where possible. Identification lettering and arrows shall be placed as directed by the Engineer, but shall generally be located each fifteen feet in pipe length and shall be properly inclined to the pipe axis to facilitate easy reading. Titles shall also appear directly adjacent to each side of any wall or slab the pipeline passes through.

D. The titles and arrows shall be painted by use of stencils and shall identify the contents by complete names at least once in each area through which it passes and thereafter be abbreviated. Stencils shall be provided for titles and abbreviations listed in Table 09900-2.

E. Title color shall be black or white as directed and shall have an overall height in inches in accordance with Table 09900-3. Letter type shall be Helvetica Medium upper case. The Manufacturer's instructions shall be followed in respect to storage, surface preparation and application. For piping less than 3/4-inch diameter (as identified in Table 09900-2), the Contractor shall furnish and attach corrosion resistant color tags with the required lettering.

F. Banding

1. Where bands are indicated in the Pipe Color Coding Schedule, the pipe is to be painted for its full circumference with a band of the color indicated. The bands shall be six inches wide, neatly made by masking, and spaced eight feet apart. The Contractor may substitute precut prefinished bands on piping subject to acceptance by the Engineer. Where banded pipes are running concurrently in a space, bands shall be located so that on adjacently located pipes, bands will be grouped beside each other.

3.10 OSHA SAFETY COLORS

A. Items listed in ANSI Z53.1-1971, Section 2.1 shall be painted ANSI Red. In general, these items shall include fire protection equipment and apparatus; wall mounted breathing apparatus, danger signs and locations; and stop bars, buttons or switches. In addition all hose valves and riser pipes, fire protection piping and sprinkler systems, and electrical stop switches shall be painted ANSI Red.

B. Items listed in ANSI Z53.1-1971, Section 2.3 shall be painted ANSI Yellow. Yellow shall be the basic color for designating caution and for marking physical hazards such as striking against, stumbling, falling, tripping, and "caught in between". In addition, an 8-inch wide strip on the top and bottom tread of stairways shall be coated.

3.11 WORK IN CONFINED SPACES

A. The Contractor shall provide and maintain safe working conditions for all employees. Fresh air shall be supplied continuously to confined spaces through the combined use of existing openings, forced-draft fans, or by direct air supply to individual workers. Paint fumes shall be exhausted to the outside from the lowest level in the contained space.

B. Electrical fan motors shall be explosion proof if in contact with fumes. No smoking or open fires will be permitted in, or near, confined spaces where painting is being done.

3.12 CLEANING

A. The buildings and all other Work area shall be at all times kept free from accumulation of waste material and rubbish caused by the Work. At the completion of the painting, all tools, equipment, scaffolding, surplus materials, and all rubbish around the inside the buildings shall be removed and the Work left broom clean unless otherwise specified.

TABLE 09900-2
PIPE COLOR CODING SCHEDULE

EQUIPMENT/PIPING	SUGGESTED COLOR
Reaeration Air (Non stainless steel)	Match existing color

TABLE 09900-3
PIPE IDENTIFICATION SCHEDULE*

PIPE TITLE	PIPE ABBREVIATION
REAERATION AIR	RA

**Refer to Section 15000, Pipe Schedule for additional pipe titles*

TABLE 09900-4
HEIGHT OF PIPING LETTERING

Diameter of Pipe or Pipe Covering	Height of Lettering
4 to 6 inches	1-1/4 inches
8 inches	2-1/2 inches

1. *Letter type shall be Helvetica Medium upper case. The Manufacturer's instructions shall be followed in respect to storage, surface preparation and application.*
2. *For piping less than 3/4-inch diameter (as identified in Table 09900-2), the Contractor shall furnish and attach corrosion resistant color tags with the required lettering.*

- END OF SECTION -

SECTION 11185

POSITIVE DISPLACEMENT BLOWER PACKAGES

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The CONTRACTOR shall furnish, install, test, adjust, and place in satisfactory operation two (2) heavy duty positive displacement (PD) blower systems complete with all accessories including motors, steel bases, inlet filters, inlet silencers, discharge silencers, relief valves, check valves, discharge isolation valves, weighted pressure relief valves, pressure gauges, flexible connectors, V-belt drive, guards, vibration isolation, acoustical enclosures, control panel (includes PLC, VFDs, and required electrical and controls), and other components and accessories required for a complete and operable blower system as shown on the Drawings and as specified herein.

B. Blower packages shall be installed on existing concrete pads after removal of the existing blowers. The blower package control panel shall interface with existing plant communication and electrical systems, as shown in the contract documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Division 1 – General Requirements

B. Division 5 – Metals

C. Section 09900 – Painting

D. Division 15 – Mechanical Construction

E. Division 16 – Electrical

F. Division 17 – Instrumentation

1.03 SUBMITTALS

A. In addition to the submittal requirements specified in Section 01300 - Submittals, submit the following material/information for review:

1. Performance affidavit

2. Complete shop drawings including, but not limited to:

   a. Performance characteristics and descriptive data.

   b. The blower capacity (in icfm and scfm) based on corrections made for the worst case site conditions.

c. Detailed equipment dimensional drawings and setting plans.

d. General lifting, erection, installation, and adjustment instructions, and recommendations.

e. Overall equipment layout and piping interconnection drawings.

f. Shall include the layout and proposed anchor bolt locations on the existing equipment pad

g. The total uncrated weight of the equipment plus the approximate weight of shipped materials. Support locations and loads that will be transmitted to bases and foundations. Exact size, placement, and embedment requirements of all anchor bolts.

h. Details on materials of construction of all components including applicable ASTM designations.

i. Information on bearing types and bearing life.

j. Gear box design and performance criteria and AGMA service factor.

3. Shop drawings for electric motors shall include motor data sheets, dimensioned drawings, wiring diagrams (space heaters, temperature devices, etc.) identifying electric characteristics and design, mechanical construction, manufacturer's name, type and pertinent specifications for the use intended, along with the name of the equipment to be driven.

4. Equipment and motor protective device details. Connection diagrams for motor and all protective devices.

5. Equipment shop and final coating systems, interior and exterior.

6. Control Panel layout drawings, wiring diagrams, network interface diagram, and component product data sheets for control panels.

7. Support locations and loads that will be transmitted to bases and foundations. Weights of all system components and the total weight of the operating blowers.

8. Complete electrical field termination drawings.

9. Electrical equipment product data sheets.

10. Field test results.

11. Spare parts list

12. Warranty documentation including statement of duration of warranty period and contact phone numbers and addresses for warranty issues.

1.04 PERFORMANCE AFFIDAVIT

A. CONTRACTOR shall submit manufacturer's Performance Affidavit for blower equipment to be furnished.

B. By these affidavits, each manufacturer must certify to the CONTRACTOR and the Owner, jointly, that he has examined the Contract Documents and that the equipment, apparatus, or process he offers to furnish will meet in every way the performance requirements set forth or implied in the Contract Documents.

C. The CONTRACTOR must transmit to the Engineer three (3) original copies of the affidavit given him by the manufacturer or supplier along with the initial Shop Drawing submittals.

D. The Performance Affidavit must be signed by an officer of the Basic Corporation, partnership, or company manufacturing the equipment and witnessed by a notary public.

E. The Performance Affidavit shall have the following format:

Addressed to: CONTRACTOR and OWNER

Reference: City of Venice EWRF Reaeration Blower Replacement Project

Text: (Manufacturer's Name) has examined the Contract Documents and hereby state that the (Product) meets in every way the performance requirements set forth or implied in Section ____ of the Contract Documents.

Signature: Corporate Officers shall be Vice President, or higher. (Unless statement authorizing signature is attached.)

105 OPERATION AND MAINTENANCE MANUALS

A. Furnish Operation and Maintenance manuals required as specified in Section 01300 and Section 01730.

1.06 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. All equipment, materials, and installations shall conform to the requirements of the most recent editions with latest revisions, supplements, and amendments of the specifications, codes, and standards listed in Section 01070, Abbreviations and Reference Standards.

1.07 SERVICES OF MANUFACTURER'S REPRESENTATIVE

A. The CONTRACTOR through the blower package manufacturer shall provide the services of qualified technical representative with at least five (5) years of experience who are regularly involved in the inspection, installation, start-up, troubleshooting, testing, maintenance, and operation of positive displacement blower systems. The technical representative shall:

1. Witness and check installation.

2. Assist the CONTRACTOR in conducting field tests and preparing a written report as specified below.

3. Witness and check start-up of the system.

4. Assist the CONTRACTOR in making adjustments and modifications as necessary to optimize operation of system components.

5. Troubleshoot and correct any mechanical or control problems that are noted during tests and start-up.

6. Submit written certification that the systems have been properly installed, tested, and adjusted; and that all controls and protective devices operate properly, including date of final acceptance test, as well as a listing of all persons present during the tests.

7. Investigate and supervise correction of any operating problems that may arise up to the end of the guarantee period of the equipment.

8. Instruct OWNER personnel in the operation and maintenance of the equipment.

B. The services of a qualified blower package manufacturer's technical representative shall be provided at no additional cost to the OWNER for a period of not less than three (3) days as follows:

1. At least one trip of one (1) day to verify installation of the equipment.

2. At least one trip of two (2) days after acceptance of the equipment for start-up and training purposes.

C. Any additional time required to achieve successful installation and operation shall be at the expense of the CONTRACTOR.

D. For each site visit, the technical representative shall submit jointly to the Owner, the Engineer, and the CONTRACTOR a complete signed report of the results of his inspection, operation, adjustments, and testing. The report shall include detailed descriptions of the points inspected, tests and adjustments made, and any quantitative results obtained.

1.08 WARRANTY AND GUARANTEE

A. The blower package furnished under this Contract shall be guaranteed to be free from defects in workmanship, design and/or materials for a period of two (2) years. The period of the warranty shall start on the date the blower package is placed in use by the Owner with corresponding start-up certification provided by the blower manufacturer’s technical representative that the blower package demonstrates satisfactory performance during the field testing of the blower package. If the blower package does not perform satisfactorily during the seven day operational period (discussed in Section 01660, Equipment Testing, Training, and Start Up), the start of the warranty period will be delayed until the blower package demonstrates proper operation.

B. The blower manufacturer shall repair or replace, without charge to the Owner, any part of the blower package which is defective or showing undue wear within the warranty period, or replace the blower package with a new equipment if the mechanical performance is unsatisfactory; furnishing all parts, materials, labor, etc., necessary to return the blower package to its specified performance level.

PART 2 -- PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Blower packages shall be Aerzen Model GM 15L or Kaeser Model DB 166C.

2.02 PERFORMANCE REQUIREMENTS

A. Operating conditions and performance requirements are provided in the table below. The blowers shall be capable of providing the specified blower capacity at the design discharge pressure at the package discharge flange at the design temperature, relative humidity, inlet pressure and barometric pressure specified below. The discharge pressure specified below is the required pressure at the blower package discharge flange. The blower package manufacturer shall account for all inlet losses (inlet filter, inlet piping, silencer, etc.) and all discharge losses (silencer, check valve, etc.) within the blower package in determining the total differential pressure to be provided by the blower.

	Process Air Blowers
Number of Units	2
Blower Identification Number	70-B-1 70-B-2
Site / Operating Conditions	
Elevation, feet above MSL	19.5
Barometric Pressure, psia	14.7
Maximum Temperature, °F	105
Minimum Temperature, °F	35
Maximum Relative Humidity, %	100
Performance Requirements at Design Point	
Design Temperature	95
Design Relative Humidity, %	100
Design Minimum Inlet Pressure, psia	14.5
Blower Capacity, scfm	350
Blower Capacity, icfm	390
Discharge Pressure at Package Discharge Flange, psig	6.52
Maximum Power Draw/Blower at Blower Shaft, bhp	15.6

Maximum Blower Speed at Design, rpm	3,560
Minimum Blower Capacity, icfm	85
Maximum Blower Pressure Capability, psi	12
Acoustic Enclosure Type	Close Fitting
Sound level 3' from enclosure in free field conditions, dBA	70

B. Blower package manufacturer shall select motor size to address worst case site operation conditions. The electrical system design is based on furnishing 20 hp blower motors. The CONTRACTOR shall be responsible for all modifications necessary to accommodate larger motors at no additional expense to the OWNER.

C. Belt shall be designed for maximum speed of the blower and allow for turndown of the blower via the VFD.

2.03 BLOWER CONSTRUCTION

A. A welded steel fabricated base or combination base frame and discharge silencer shall be provided for mounting the blower, electric drive and driver base. The base shall be of a rigid box section shape. The box section shall be properly stiffened and present large bearing areas for carrying the load on the foundation. The base shall be rigid to prevent deflection during start-up and normal operation that would affect alignment. Resilient isolation pads shall be provided between the concrete mounting or bottom of the blower enclosure and the base of the blower unit. The base shall support the blower and a pivoting motor base. The motor shall be mounted on the pivoting base. The weight of the motor, in conjunction with (2) springs (if needed) shall provide belt tension for the V-belt drive assembly. Installation shall conform to recommendations of the blower and V-belt component manufacturers including motor, V-belt drive, guard, controls, and all necessary items.

1. Belts shall be "Red power" belts by Optibelt, or equal.

2. V-belts shall be of the stretch resistant type with an adjustable belt tensioning mechanism.

3. Belts shall have a minimum temperature rating of 212 degrees F and shall not require any maintenance checking or tensioning after initial installation and startup. Belts that require checking of tensioning every 500 hours or less shall not be acceptable.

B. The blower casing shall be of one piece with separate headplates, and shall be made of close-grained cast iron suitably ribbed to prevent distortion under the specified operating conditions. Inlet and outlet shall be flanged connections. The casing shall incorporate a proven means of pulsation cancellation such that the sound pressure level measured 3 feet from the front and side panels of the blower package does not exceed the value specified in Paragraph 2.02. The vibration level as measured at the blower casing, in the X/Y planes of the bearings, shall not exceed 0.55-inch/sec RMS when operating at the specified maximum operating pressure and speed in the actual blower package.

C. Each lobe shall be made from a ductile iron casting. Shafts shall be alloy steel forgings. Alternatively, the lobe and shaft shall be of one piece construction that is machined together or as a single drop forged piece of AISI 1043. The lobes shall be of the straight, tri-lobe involute type and shall operate without rubber or liquid seals or lubrication and shall be positively timed by a pair of accurately machine heat-treated alloy steel, helical tooth or straight cut timing gears. The timing gears shall be mounted on the lobe shafts with a press fit and keyed or mounted by hydraulic expansion onto the blower shafts with a tapered interference fit. One gear shall be equipped with a hub and a gear to facilitate accurate and easy timing. Each lobe/shaft shall be supported by anti-friction bearings sized for a minimum of 100,000 hours B-10 life.

D. The lube oil system shall be supplied with a sight glass and ample oil reservoir capacity. Piston ring oil seal shall be provided at each bearing, designed to prevent lubricant from leaking into the air stream. Rotary piston ring shaft seals shall be provided at the point where the shaft passes through the head plate (air seal). A total of 16 piston ring seals shall be provided for each blower. Further provision shall be made to vent lubricant to the impeller side of the oil seal to atmosphere to eliminate any possible carryover of lubricant into the air stream. Lip seals inside the blower shall not be acceptable. Lip seal is allowed at the drive shaft only, complete with wear sleeve.

E. The timing gears and the bearings shall be splash oil lubricated from oil slingers mounted on the driven shaft and dipping in oil. Grease lubricated bearings shall not be acceptable. Each bearing shall be equipped with an oil deflector disc if necessary to further reduce oil leaks

F. Blower package shall be designed to allow ease of access to oil drain plugs.

G. The Blower Manufacturer's shop welding procedures, welders, and welding operators shall be qualified and certified in accordance with the requirement of AWS D1.1 "Structural Welding Code - Steel" or AWS D1.6 "Structural Welding Code – Stainless Steel" of the American Welding Society, as applicable.

H. All equipment greater than 100 pounds shall have lifting lugs, eyebolts, etc., for ease of lifting, without damage or undue stress exerted on its components.

I. Manufacturer shall design the sizing, embedment, and location of anchoring bolt system for the blower packages to anchor the blower package to the existing concrete pad. Anchor bolts shall be Type 316 stainless steel. Anchor materials and type shall be per Section 05050, Metal Fastening. The location of the anchor bolts shall account for anchor bolt location for existing blower and reinforcing steel in the equipment pad.

J. Structural steel used for fabricating equipment shall conform to the requirements of Section 05010, Metal Materials.

K. All materials shall conform to applicable provisions of the AISC Specifications for the design and fabrication of structural steel, and to pertinent ASTM Standard Specifications.

L. All dissimilar metals shall be properly isolated

2.04 BLOWER ACCESSORIES

A. Each blower shall be supplied with one combination inlet filter silencer. The inlet filter silencer shall be mounted directly to the inlet flange of the blower. Filter element shall be washable by maintenance personnel as a preventative maintenance procedure.

B. If a combination inlet filter silencer is not proposed by the manufacturer, then each blower may be supplied with one inlet silencer and one inlet filter. The inlet silencer shall be a combination chamber and absorptive design for maximum sound attenuation. Inlet silencer performance losses shall be included by the blower vendor in the blower performance calculation.

C. Each blower shall be supplied with one combination base frame and discharge silencer or separate structural steel base and conventional discharge silencer. The silencer shall feature a single or double shell of pressure vessel quality steel with continuous welds. The temperature rating shall be 300°F. The design of the silencer must accommodate being bolted directly to the blower discharge flange with no intermediary pieces, and shall be designed to assure that there will be no disturbing pipe beating noise or pipe harmonics whether one blower or multiple blowers are running. The discharge silencer and acoustic enclosure shall be designed to reduce the sound pressure level emitted by the blower package such that it does not exceed the value specified in Paragraph 2.02 over the entire range of operation measured 3 feet from the front, back and at two locations opposite each side panel in free field conditions. The blower manufacturer shall supply a stainless steel grounding lug fully welded to the base or shall ground the base to the sound enclosure through a ground wire.

D. Each blower package shall include flexible connector(s) which connect to the plant piping. Flexible connector(s) will be located downstream of the discharge silencer. The flexible connectors shall be suitable for the maximum operating temperature and pressure ratings of the equipment in the air stream.

E. Each blower shall be supplied with a V-belt drive and belt guard that shall be of the high capacity type, oil and heat resistant. Drive shall be designed for a minimum service factor of 1.4 times the maximum blower horsepower. Belt tensioning shall be easily adjustable for maintaining proper tension. Sheaves shall be dynamically balanced regardless of the operating speed.

F. Each blower shall be supplied with vibration isolating mounts. Blower manufacturer shall be responsible for attenuating noise and vibration in the blower package.

G. Each blower shall be supplied with a single or dual pressure relief valve/s on the discharge side of the blower mounted downstream of the discharge silencer and upstream of the check valve. The relief valve/s shall be set to protect the blower from exceeding its maximum pressure rating. The materials selected for the valve internals shall enable safe and reliable operation at the site conditions. The valve/s shall be sized to pass 110% of the design flow. The valve shall be field adjustable, spring loaded type and have a proportional operating characteristic with respect to the pressure set point. Initial setting of the relief valve shall be as required by the manufacturer to protect the blower from exceeding its maximum rated pressure capacity.

H. Check valves shall be provided on the discharge of each blower unit within the acoustic enclosure. Check valve shall be ductile iron with 316 SST shaft, plate, and springs, and Viton sealing member suitable for 300°F or shall be of the full-bore low pressure drop, flapper type design with an aluminum or steel body and steel flap embedded in Viton with full contact seal all suitable for 300°F. Valve shall be rated for 25 psig minimum working pressure.

I. The blower manufacturer shall furnish a discharge isolation butterfly valve for each of the new blowers outside of the enclosure as shown on the Drawings. Valves shall be high performance, resilient-seated butterfly valves as manufactured by Centerline (Crane), Bray or engineer approved equal. Valves less than 30-inches shall have a wafer or lug style body and be compatible with ASME B16.1 flanges. The CONTRACTOR shall coordinate flange connections upstream and downstream of the wafer valves. Valves shall have ductile iron bodies, with 316 stainless steel discs and shafts. Viton seats suitable for 300° F operation shall be provided. All valve components shall be suitable for operation at temperatures up to 300°F with a 25 psig minimum working pressure. Discharge isolation valves shall be provided with a handwheel operator and shall provide for tight shut-off. A mechanical dial indicator shall be provided on the operator to continuously indicate valve position.

J. In addition to the single or dual pressure relief valve/s provided in Part 2.04.G, weighted pressure relief valves shall be provided on the discharge of each blower outside of the acoustic enclosure as shown on the Drawings. Relief valve shall be set to discharge pressure in excess of the setpoint to protect the blower system in the event that the positive displacement and multistage blowers are operating concurrently. The materials selected for the valve internals shall enable safe and reliable operation at the site conditions. The single valve shall be sized to pass 110% of the design flow. The valve shall be field adjustable, weighted type and have a proportional operating characteristic with respect to the pressure set point. Initial setting of the relief valve shall be 9.5 psig.

K. Pressure relief valves shall have cast iron bodies, bronze fitted with grey iron diaphragm base and straight chamber and phosphorus bronze diaphragm. The ratio of the diaphragm area to the seat area shall be adequate to overcome sticking. The seat disc shall be of non-corrodible, non-sticking material capable of withstanding extreme temperatures. Valves shall permit dismantling for repairs and cleaning without being removed from the line. Valves shall conform to the ASME Boiler Construction Code as approved by both the Underwriters Lab., and the National Board of Boiler Pressure Vessel Inspectors. All valves shall be designed for a minimum working pressure at least equal to the working pressure of the corresponding pipeline and shall have adjustment over a range of at least 20 percent above or below the required setting pressure of the installation.

L. Provide a liquid-filled pressure gauge for each blower discharge and suction equal to Type 1009, Grade 1A (1.0% F.S.) as manufactured by Ashcroft or equal.

1. Range: 0 to 15 psig (discharge).

2. Accuracy: ±1% of full scale.

3. Dial: 4-1/2” diameter; 270° scale; heavy gauge aluminum with white background and black markings; 0.25 psig/0.20 inches WC minor divisions.

4. Case: Stainless steel.

5. Bourdon Tube and Socket: 316 Stainless Steel

6. Connection: ¼” NPT.

7. ¼” stainless steel pressure snubber.

8. Pressure gauges shall be mounted to the sound enclosure wall.

M. Provide a liquid filled bimetal thermometer for each blower discharge as manufactured by Ashcroft or equal.

1. Range: 50 to 300°F Series EL discharge and - 40 to 160°F inlet.

2. Accuracy: ±2% full span.

3. Dial: 3” or 4” diameter; 270° scale; heavy gauge stainless steel with white background and black markings; 5°F minor divisions.

4. Case: Stainless steel.

5. Ring: Stainless steel.

6. Movement: Stainless steel.

7. Actuating Element: Type 304 stainless steel, precision rolled, fully annealed tubing.

8. Compensation: Bimetal compensator to offset ambient temperature changes in case area.

9. Temperature gauge shall be mounted to the sound enclosure wall.

N. A high temperature switch shall be provided for each blower as manufactured by Ashcroft or equal with an opening range of 150° to 280°F. The maximum temperature capability shall be 400°F. Sensor is to be capillary type with remote 3-3/4” brass bulb. CONTRACTOR shall provide 1/2” FPT in discharge piping near blower for thermostat well. Piping 4 inches and over may be drilled and tapped. The temperature switch shall be provided by the blower manufacturer to be installed on the discharge piping by CONTRACTOR. The Discharge Temperature Switch/Gauge shall be wired to the Terminal Box.

O. A high pressure switch shall be provided for each blower as manufactured by Ashcroft, Type 400 in NEMA 4X enclosure, B4 Series or equal. The pressure switch operating range shall be from 1 to 15 psig. The actuator seal shall be Viton. Pressure switches shall have adjustable deadband, hermetically sealed switching element and 316 stainless steel pressure port. The pressure switch shall be provided by the blower manufacturer to

be installed on the discharge piping by CONTRACTOR, unless installed as part of the manufacturer blower package.

P. A filter maintenance indicator gauge shall be provided for each blower. The indicator gauge shall be differential pressure gauge Type Magnehelic Series 2000 as manufactured by Dwyer or equal. The filter maintenance indicator gauge shall be mounted to the sound enclosure wall.

Q. Each blower shall receive its initial oil filling at the factory. Oil requirements shall be such that the oil shall be available from a local source.

2.05 BLOWER MOTORS

A. The blower manufacturer shall be responsible for furnishing a 20 horsepower electric motor for each process air blower. The manufacturer shall be responsible for the proper selection, testing, installation, and operation of the motors and for coordinating the motors with the blower equipment. Motors shall be new and both materials and workmanship shall be of the very best quality. Motors shall be XE Premium Efficiency Motors, as manufactured by Reliance; W22 as manufactured by WEG, or equal.

B. Motors shall be horizontal squirrel cage induction motors designed in accordance with the latest ANSI, NEMA, and IEEE standards. Motors shall be 480 volts, 3-phase, 60 Hz. Motors shall be designed and manufactured for continuous duty for operation under the following conditions:

1. Elevation of 20 feet above mean sea level.

2. Ambient temperature ranging 0 degrees F to 104 degrees F.

3. Voltage variations of ±10 percent.

4. Frequency variation of ±5 percent.

5. Combined voltage and frequency variation of ±10 percent with frequency variation not exceeding ±5 percent.

C. Motors shall be inverter duty rated suitable for operation with the variable frequency drive (VFD) supplied with the control panel. Motor horsepower shall be equal to or greater than the load over the full range of operating conditions. Motor maximum speed shall not exceed 3,600 rpm.

D. Motor torque characteristics shall be at least 20 percent greater than the maximum full load torque requirements over the full range of operating conditions from start-up to full load.

E. Motor enclosure shall be TEFC corrosion protected. Motor shall be designed for quiet operation. Motor sound pressure shall not exceed 77 dBA at 3 feet from the motor.

F. Motors shall provide premium efficiencies and power factors throughout their operating range. The power factors specified shall be achieved without the use of power factor

correction capacitors. Motors shall provide minimum efficiencies and power factors as follows:

Full Load	Minimum Efficiency	Minimum Power Factor
100%	95.6%	85%
75%	95.6%	82%
50%	93.1%	74%

G. Efficiencies and power factors for each motor shall be verified by shop testing as specified.

H. Motor winding insulation shall be Class H with Class B temperature rise. Manufacturer's premium grade insulation shall be used.

I. The stator shall be assembled from high grade electrical sheet steel laminations adequately secured together. Stator windings and end turn connections shall be fully braced to withstand all mechanical, electrical, and thermal stresses. The shaft shall be made of high grade machine steel or steel forging and of size and design adequate to withstand the load stresses. The rotor shall be fabricated of high grade electrical sheet steel laminations, or die cast aluminum, adequately fastened together and to the shaft.

J. Bearings shall be grease lube ball bearings. Split bearing housings shall be used such that bearings can be inspected or replaced without disturbing alignment.

K. Motor leads shall be suitably marked and identified. Each motor shall be provided with an oversized terminal box with space for connections and shall be constructed of cast iron or fabricated steel, neoprene gasketed and bolted.

L. Motors shall be designed and manufactured for operation in the direction required for the blowers. The phase sequence shall be marked permanently and plainly inside the stator lead junction box.

M. Motors shall have breather and drain plugs to allow for drainage of any moisture from inside.

N. Each motor shall be provided with a normally closed motor winding temperature switches or PTC thermistor (minimum of 2 per phase).

O. Motors shall be supplied with space heaters for 120V operation.

2.06 ACOUSTICAL ENCLOSURE (CLOSE-FITTING TYPE)

A. Each blower shall be supplied with a sound enclosure designed for outdoor installation covering the entire blower package including the drive motor, the inlet silencer, and the discharge silencer. The sound enclosure must be designed for easy inspection and maintenance of all blower package components.

1. Panels shall be made of steel sheet, externally coated with a premium coating system. Sound enclosure acoustic material as a minimum shall comply with UL 94 or UL 723 for fire-retardant, self-extinguishing, non-dripping materials. Materials with a lesser rating shall not be acceptable.

2. A grounding strap shall be installed between the blower base and the package skid to bypass any vibration isolating mounts.

3. Quick release panels, each less than 50 lb shall provide easy and quick access for routine maintenance of the blower and the package components. For panels heavier than 50 lbs, hinged doors shall be supplied, with the appropriate frame, reinforcements and supporting elements.

4. A driven ventilation fan shall provide ventilation and cooling integral to the sound enclosure and shall operate whenever the blower is operating and include a thermostat mounted within the enclosure. For electrical, non-shaft driven fans, the control panel for the blowers shall provide the 110V cooling fan power off the 480 volt power supply to the panel. The fan shall be capable of limiting the temperature within the acoustical enclosure to 125°F with an outside temperature of 105°F. Cooling fan shall be sized for sufficient heat removal from the sound enclosure.

5. All enclosure fasteners shall be stainless steel.

2.07 CONTROLS AND INSTRUMENTATION

A. BLOWER SYSTEM CONTROL PANEL: The two blowers shall be controlled through a control panel designed for 460 Volts, 3 phase, 4 wire service. The panel shall be designed for the equipment supplied and shall be provided by the blower manufacturer for unit responsibility. Panel enclosures shall be pre-fabricated enclosures as provided by EXM Manufacturing, Hoffman, or approved equal.

B. CONTROL PANEL CONSTRUCTION: Panels shall be constructed in accordance with UL 508 requirements for enclosed industrial control panels and shall bear the serialized UL label. Enclosure construction shall include:

1. NEMA 4X Type 316 stainless steel enclosures, minimum 14 gauge, coated with a white epoxy coating to keep internal panel temperatures to a minimum

2. Suitable for mounting outdoors in conditions found in southwest coastal Florida

3. Equipped with mounting legs fastened to a concrete pad

4. Hinged outer door with suitable quick-connect latching mechanisms

5. Hinged, removable inner dead front door fabricated from 5052-H32, 0.080 inch thick-brushed marine alloy aluminum

6. Inner door hold-open mechanical latches

7. 12-ga steel, formed, removable subpanel, degreased, cleaned, treated with a phosphatizing process, and then primed and painted with 1-2 mil industrial grade baked white enamel

8. Fitted with Type 316 stainless steel stand-off sun shields (1-inch gap minimum) on

the top, sides, front, and back, coated with a white epoxy coating to keep internal panel temperatures to a minimum

9. Cutouts in the sun shields as required for the panel A/C unit and accessing the quick release mechanisms

10. Designed for bottom conduit entry only

C. CONTROL PANEL MOUNTING: The CONTRACTOR shall install the panels on a 4" high concrete pads mounted on neoprene rubber gaskets on the panel legs, anchored using Type 316 stainless steel concrete anchors.

D. PANEL FABRICATION:

1. Enclosures shall provide mounting for power supplies, control equipment, input/output subsystems, and panel mounted equipment and appurtenances. Ample space shall be provided between equipment to facilitate servicing and cooling.

2. Enclosures shall be constructed so that no screws or bolt heads are visible when viewed from the front. Penetrations for instruments and other devices shall be clean and smoothly finished with rounded edges.

3. The temperature inside the enclosure shall be continuously monitored and shall generate an alarm to the PLC if the temperature rises to an adjustable, preset high temperature, initially set at 5°F above maximum range of panel air conditioner setting (~90°F). This thermostat shall be independent and separate from the thermostat used to control panel air conditioner.

4. Intrusion alarm switch, wired fail-safe, shall be provided on the enclosure to generate an alarm to the panel PLC when the enclosure door is opened.

5. All wiring shall be bundled with nylon cable ties when exposed (leaving in conduits, at bends, etc.) but otherwise shall be routed and enclosed in vented plastic wireway as required. Wireways shall be oversized by a minimum of 10%; overfilled wireways shall not be acceptable. DC power, analog signal and discrete signals shall be run in separate wireways from AC signal and power wiring.

6. Spare field wiring shall be bundled, tied, and labeled as specified above, and shall be neatly coiled in the bottom of the cabinet.

7. All installed spare I/O hardware shall be wired along with live I/O wiring to the field wiring terminal blocks within the cabinet. Where space for spare I/O modules has been provided with the PLC backplane or DIN-rail mounting system, corresponding space for wiring, surge protection, and terminations shall be furnished within the cabinet.

8. A copper ground bus shall be installed in each cabinet, and shall be connected to the ground rod installed external to the panel under Division 16.

9. Interior panel wiring shall be tagged at all terminations with machine-printed self-laminating labels. Labeling system shall be Brady TLS 2200 Printer with TLS 2200®/TLS PC Link™ labels, or equivalent system by Seton or Panduit. The wire numbering system and identification tags shall be as specified in Section 16123, Building Wire and Cable.

10. Main breaker and branch breaker sizes shall be coordinated such that an overload in a branch circuit will trip only the branch breaker but not the main breaker.

11. Enclosure shall be provided with 120-volt duplex receptacle for service of equipment and a door switch operated LED service panel light. Power to these devices shall be independent from the PLC power supply and its associated uninterruptible power system.

E. CONTROL PANEL COMPONENTS: The panels shall consist of the following components:

1. Manual Main Breaker handle mounted on the panel interior dead front door to disconnect all power to the panel and prevent the dead front door from being opened when in the ON position unless manually bypassed.

2. Variable Frequency Drive (VFD): The panel shall include a VFD for each blower motor. VFD shall be as supplied by Square D Altivar 630 with Ethernet adapters to interface directly with the PLC. Ethernet cable within the panel shall be Allen Bradley 1585-C8CB-S600 with LAPP Group PN 2170060 Connectors, or equal, to protect against interference from 480V power within the panel. Drive shall have contacts for panel indicator running and fault lights.

3. Motor Power and Control Circuit Breakers: Provide breakers for each motor power circuit and a breaker for the 120V power circuits. Provide branch circuit breakers for the panel receptacle and light, panel air conditioner unit, each blower space heater, each blower enclosure cooling fan, and PLC UPS power, with UPS power branch circuit breakers for 120V control power and for each individual PLC input/output card. The circuit breakers shall be quick-make, quick-brake and trip free. The thermal and magnetic elements shall operate independently and be designed with a common trip bar breaking all poles when a fault is received on any pole. The circuit breakers shall be as manufactured by Square D, no equal, for both 120V and 460V service.

4. Programmable Controller (PLC): The panel shall include a PLC for all control logic. The PLC shall be a Schneider Electric Modicon M340 PAC using I/O modules commonly stocked by the Owner and programmed using Unity 8.1 software or latest version used by the Owner. PLC hardware and software shall be provided to allow operators to make changes to setpoints and control settings within the PLC over an Ethernet fiber optic link to the plant Human-Machine Interface (HMI). Software ladder programming shall be set up to allow modifications to the programming either through direct laptop connection at the PLC or over the Ethernet link to the plant work station(s).

5. Fiber Optic Interface: The panel PLC shall communicate with the plant PLC network directly over a fiber optic link. PLC Fiber-to-Ethernet converter, and fiber cable shall match existing fiber optic network equipment using a Hirschmann RS20 network switch and a standard fiber patch panel. Fiber optic cable connections shall match existing cable connection type. Provide components within the existing plant PLC panel as needed for connection to the existing plant network switch through the existing fiber patch panel.

6. Panel Air Conditioner: The panel shall be fitted with a side-mounted air-conditioning unit to maintain internal panel temperatures below 85ºF, which shall be McLean Panel A/C units. Cooling shall be closed loop to separate sealed internal panel air from outside air to maintain the panel NEMA 4X rating. The unit shall be of stainless steel construction with exterior shields and special coatings applied to coils and copper lines exposed to ambient air to protect the unit from corrosive ambient conditions. Units shall operate on 120V ac power. Thermostat shall be mounted inside the panel.

7. Uninterrupted Power Supply (UPS): The PLC shall operate on 120V power from a UPS securely mounted inside the panel (loose installation at bottom of panel not acceptable). The UPS shall be APC, Best, or approved equal with status inputs to the PLC for battery life low, running on battery, or system fault. UPS shall be sized, and panel shall be wired, to power all components within the panel other than the panel light, receptacle, motor starters, and air conditioner (motor space heaters and blower enclosure ventilation fans circuits are also not on UPS power) for a minimum of 1 hour under full load. Panel air conditioner shall be sized to dissipate the heat generated by the UPS when running on battery, full load.

8. Fiber Optic Cable: Provide new fiber optic cable for connecting the new control panel to the existing plant SCADA system. Fiber cable to be provided and installed to match existing equipment used throughout the plant. Supply and install all necessary components for a complete and fully functional fiber link between the new control panel and the existing plant SCADA servers through a connection to an existing network switch within an existing PLC panel as noted on the Drawings. Supply ample fiber cable for the distance between the panels with at least 5 feet spare length of cable each end.

9. Power/Phase Monitor: A power monitor relay shall be installed and connected to the panels main 480V feed. When the relay is deactivated, it shall disconnect control power and register an alarm to the PLC. The relay shall be deactivated in the event of phase loss, phase reversal, or low voltage. The phase monitor relay shall be as manufactured by Phoenix Contact.

10. Load Monitors: Provide power load monitors on the power feed to the blower starters to detect a high current load on each motor. Load monitoring current transformers shall be as manufactured by Phoenix Contact.

11. Hand/Off/Remote (HOR) selector switches for each blower shall be mounted on the panel interior dead front door. Switches shall be SPDT, two- or three-position selector switches. Reset Pushbuttons for both motors shall be momentary contact

type with black operator. The selector switches and pushbuttons shall be Square D Type SK, A/B Type 800H, IDEC, or pre-approved equal.

12. Elapse Time Meters: Provide one for each blower. Units shall be round, six digit, non-resettable elapse time meters interfaced with the starters, with units mounted on the inner door. The elapse time meters shall be ENM, model T5OB2 or pre-approved equal.

13. Pilot Lights: Pilot lights shall be provided to indicate run status and alarms for both blowers. Pilot lights shall also be provided for each Motor HIGH TEMP, Discharge HIGH TEMP, Discharge HIGH PRESS, Starter OVERLOAD, and Motor OVER CURRENT. The pilot Lights shall be Square D Type SK, A/B Type 800H, IDEC, or pre-approved equal, mounted on the front exterior face of the panel.

14. Surge Suppression: Provide a surge arrestor installed on the line side of the main breaker in accordance with manufacturer's instructions. Provide surge suppression devices on all signal and power leads on all circuits leave the control panel. Surge devices shall be as manufactured by Phoenix Contact:

    - for 110VAC Signal use Phoenix Contact 2794987
    - for 120VAC Power use Phoenix Contact 2856812
    - for 4-20mA signals use Phoenix Contact 2838186
    - for 480VAC power use Phoenix Contact 2800718

15. As-built Drawings: A laminated "As Built" copy of the panel wiring diagrams shall be provided and placed in the panel print pocket for all panels that include PLCs. All panel drawings shall be developed using AutoCad®. The drawings shall have a complete Bill of Materials, panel exterior and interior layouts, and show all electrical wiring. As-built drawings shall be submitted with the O&M materials on a CD in both AutoCad® (.dwg) and Adobe Acrobat® (.pdf).

16. Terminals: Terminal blocks shall be as follows:

    a. Terminal blocks shall be assembled on non-current carrying galvanized steel DIN mounting rails securely bolted to the cabinet subpanel. Terminals shall be of the screw down pressure plate type as manufactured by Allen Bradley or Phoenix Contact.

    b. Power terminal blocks for both 120 VAC and 24 VDC power shall be single tier with a minimum rating of 600 volts, 30 amps.

    c. Discrete signal terminal blocks shall be 2-tier with a minimum rating of 600 volts, 20 amps. One terminal block shall be used for each signal. The positive wire shall be installed on the top or left-most terminal.

    d. Analog signal terminal blocks shall be 3-tier with a minimum rating of 600 volts, 20 amps. One terminal block shall be used for each signal. The positive wire shall be installed on the top or left-most terminal and the shield/drain wire shall be installed on the bottom or right-most terminal.

e. Only one wire shall be terminated under a single wire clamp or screw.

f. Terminal blocks for field wire connections shall be added as needed in 10-pole increments. Terminal blocks shall be mounted with a minimum of 4" from both enclosure sides and from the bottom of the enclosure for easy access to terminal screws.

g. Terminals shall be marked with a permanent, continuous marking strip. One side of each terminal shall be reserved exclusively for field incoming conductors. Common connections and jumpers required for internal wiring shall not be made on the field side of the terminal.

h. Separate terminal strips shall be provided for each type of power and signal used within each cabinet. Where applicable, terminal strips for different voltages of discrete signal wiring shall also be separated. Terminal strips shall be labeled as to voltage and function.

17. Wiring: All wiring shall be color-coded using tinned copper MTW #14 AWG minimum for power and control wiring and #16 twisted pair for analog signal wiring. Wiring and cables shall be numbered at each end. Wire numbers shall be printed on non-removable heat-shrink tags. Wires shall be color coded as follows:

Equipment Ground - GREEN

120 VAC Power - BLACK
120 VAC Power Neutral - WHITE

120 VAC Control (Internally Powered) - RED
120 VAC Control (Externally Powered) - YELLOW

24 VAC Control - ORANGE

DC Power (+) - BLUE
DC Power (-) - GRAY

Analog Signal – BLACK/WHITE

18. Component Labels: All interior panel components shall be individually labeled on the back plate with a custom engraved plastic tag with adhesive back (see Section 17000 for nameplates). The tags shall be white with black letters and match the nomenclature indicated on the as-built wiring diagrams.

19. Mounting Hardware: All mounting hardware such as screws or bolts used in the manufacturing of the control panel shall be Type 316 stainless steel. All holes in the back plate and dead front shall be drilled and tapped. No self-tapping screws, adhesive tapes, or Velcro will be accepted for the mounting of any hardware.

20. Interposing relays shall be provided on all discrete outputs on the PLC and shall be DIN rail mounting type, DPDT, minimum 10 amp, 120 VAC contact rating. Relay coils shall be 120 VAC or 24 VDC as required. Relays shall have a flag indicator

to show relay status, a pushbutton to allow manual operation of the relay, and an internal pilot light to indicate power to the coil. Relays shall be as manufactured by Square D, no equal.

21. Timing Relays shall be provided for any direct wired equipment protection circuits to prevent nuisance tripping. Timing relays shall be the general purpose DIN rail mounting type, as manufactured by Phoenix Contact. Timing relays shall be electronic type with 120 VAC coils unless otherwise specified or indicated on the Drawings. Timers shall be provided with a minimum of two SPDT timed output contacts and instantaneous contacts where required. Contact ratings shall be the same as for interposing relays as specified above.

22. Corrosion Protection: Panel interior components shall be treated with a corrosion inhibiting spray on all exposed metallic surfaces, particularly terminations, contacts, and wire ends. After installation, furnish corrosion inhibiting capsules that emit molecular level coating on metallic surfaces throughout the panel that provide specific corrosion barrier toward hydrogen sulfide and/or subsequent formation of sulfuric acid when combined with ambient moisture.

23. Panel Seal-Offs: All conduits entering the panel shall be sealed at the conduit entry point with a removable, expandable conduit seal material to prohibit outside air or process gasses from entering the panel.

F. SYSTEM OPERATION CONTROLS – The blowers shall operate as follows:

1. OPERATION – At least one blower shall operate continuously, unless faulted, when in the REMOTE on the HOR switch with manual override control from the plant HMI. In HAND, a blower shall run continuously at the selected speed set at the HMI (if in AUTO) or at the drive. In OFF, a blower shall not run.

2. ALTERNATION – Blowers shall automatically alternate duty every 168 hours based on a time set at the plant HMI. Blowers shall also automatically alternate duty if the lead blower is faulted for any reason, or fails to be running after a time delay set in the PLC logic.

3. MOTOR PROTECTION CIRCUITS – Each blower shall be stopped should any motor high temperature switch, discharge high temperature switch, or discharge high pressure switch be activated in either HAND or REMOTE. The blower shall be latched out until manually reset at the panel or over a remote reset output signal from the HMI through the PLC. The motor protection circuits shall be a hard-wired circuits and shall have alarm indicator lights on the dead front panel door.

4. MOTOR FAULT – A motor fault shall register if the either starter overload is tripped or either load monitor detects a high load (overcurrent). The fault shall latch until manually reset at the panel or over a remote reset output signal from the HMI through the PLC. An alarm shall be sent to the PLC and individually latched alarm indicator lights for each condition (overload and overcurrent) shall be provided on the dead front panel door.

5. BLOWER ENCLOSURE FAN – Each blower enclosure fan shall run based on the enclosure thermostat while the associated blower is running.

6. MOTOR SPACE HEATER – The blower motor space heater shall be turned on when the associated blower is not running.

G. CONTROL INTERFACE – Control interface shall be via direct communications between the panel PLC and the plant PLC / Human-Machine Interface (HMI) by communications over the fiber optic link. Provide devices and interface signals as follows:

1. Run status signal for each blower with a hard-wired indicator light for each from the associated VFD run contacts.

2. Speed indication feedback for each blower

3. In Remote status at the panel

4. Alarm condition signals for each blower with individual hard-wired latched indicator lights for:

   - Blower discharge high temperature
   - Blower discharge high pressure
   - Blower VFD fault (under/over voltage, overcurrent, etc)
   - Blower motor high temperature

5. Push-to-reset RESET pushbutton on the panel dead front door with parallel circuit for remote reset signal from HMI through a PLC output.

6. Alarm condition signal for phase failure.

7. Auto Selection signal from HMI one each blower

8. Manual Hand/Off blower override command signal from HMI

9. Manual speed reference setting for each blower from HMI

10. Runtime calculation value (in hours and tenths of hours) to HMI for each blower

11. Alternation time setpoint from HMI

12. Control panel intrusion alarm and panel high temperature alarm

13. UPS running and UPS fault

H. PANEL CONTROL and POWER INTERFACE: Provide terminals and dry contacts rated 10A at 120V for interface with local control devices and instruments located outside the control panel, as well as terminals for motors, as follows:

1. Discharge temperature and pressure switches

2. Motor temperature switches and space heaters

3. Motor space heater 120V power feed

4. Acoustic housing cooling fan 120V power feed

5. 480V power to the blower motors

I. PLANT WORKSTATION INTERFACE:

1. The existing plant operator workstation software interface will be modified under Division 17 by the instrumentation subcontractor. Blower manufacturer shall provide the instrumentation subcontractor with a complete list of register addresses for all status inputs, setpoints, calculated values, and command outputs as needed to allow remote monitoring and control of the blowers via the fiber optic link.

2. Local HMI Display: Provide a local industrial computer mounted on the dead front door to act as a local HMI interface for the entire facility as well as for the two new blowers. The industrial panel mounted computer shall be a Magelis iPC as supplied by Schneider Electric with the following features:

   - 15 inch display, color, TFT, 1024 X 768 pixels backlit display
   - PCT touch screen interface
   - minimum of 8GB DDR3 RAM memory
   - 160 GB SSD hard drive
   - Intel Core i3 4010U @ 1.7 GHz CPU
   - Microsoft Windows 8.1, 32-bit operating system
   - battery-backed real-time clock
   - 4 COM ports, RS-232/422/485 serial ports, USB ports, RJ45 Ethernet ports
   - Operating Voltage: 120 VAC with internal power supply
   - Enclosure Rating: IP66
   - Environment: -20-60°C, 5-95% relative humidity, non-condensing
   - 50,000 hours backlight longevity
   - 5-year warranty
   - Fully licensed view node copy of iFIX, latest version used by Owner

   The Instrumentation Subcontractor under Division 17 shall program the iFIX software on the new local HMI display to function as a complete plant SCADA work station HMI.

3. The existing plant PLC control panel that contains the network switch that is to be used for the fiber link to the new blower control panel was recently fabricated and installed by C2I, Smyrna, FL., one of the listed firms under Division 17.

4. The CONTRACTOR may elect to expand the scope of work for the instrumentation subcontractor to include the furnishing of the new blower control panel specified under this section. If so directed, the blower manufacturer shall fully coordinate with and cooperate with the instrumentation subcontractor to furnish a complete and functional system meeting all performance requirements listed herein.

2.08 SPARE PARTS

A. Furnish all special tools and appliances necessary to disassemble, service, repair and adjust the equipment and appurtenances.

B. Spare parts which are identical and interchangeable with the original parts shall be furnished in clearly identifiable and labeled containers. The CONTRACTOR shall provide the following spare parts:

- Eight (8) filter elements per blower
- One (1) year supply of manufacturers recommended oil, per blower
- One set of V-belts per blower
- One shaft seal and shaft sleeve per blower
- One temperature switch per blower
- One set of enclosure hardware (nuts, bolts, washers)
- One VFD
- One complete replacement local HMI display unit to match that supplied
- One complete panel A/C unit to match that supplied
- One PLC module for each type supplied (power supply, CPU, I/O modules, etc)
- One Ethernet switch to match that supplied
- One Ethernet-to-fiber converter to match that supplied
- Two copies of the final PLC program provided on either a USB drive or a DVD, with all set points saved in the program and documented.

PART 3 -- EXECUTION

3.01 SHOP TESTING

A. A detailed shop test plan shall be submitted with the Shop Drawings. The shop test plan shall fully describe the manufacturer's test facilities and the test procedure to be used.

B. After assembly, each blower system shall be factory lubricated, aligned and operationally tested. Run time on each blower shall be at least one (1) hour after which each blower shall be rechecked for alignment and tension of V-belts and adjusted if necessary. If adjustments are made, the blower(s) shall be restarted and run an additional 15 minutes, shut down and rechecked again.

C. Each blower system shall be provided with a bench test complying with ISO 1217 to demonstrate compliance with all specified performance requirements.

D. A report on each blower system shall be furnished with the O&M manuals giving as a minimum the following readings taken during shop tests at or near the end of the one hour run time.

1. Motor current, per phase.

2. Applied motor voltage, phase-to-phase

3. Discharge pressure, psi

4. Air Flow, scfm

5. Air Flow, icfm

6. Blower discharge air temperature

7. Vibration levels in inch/second of blower housing in horizontal, vertical and axial direction.

8. Inlet air temperature

9. Barometer, psia

10. Relative humidity, %

11. Speed

12. Sound pressure level in dbA measured at 3 ft. from the blower system in six locations: one on each short side of the blower, and two on each long side of the blower. A comparison shall be made of tested performance to specified performance including calculations of variance from specified requirements.

E. Performance tests shall be conducted at the specified blower speed and three reduced speeds to verify performance curve. Tolerances allowable in testing shall be as approved by the ENGINEER.

F. A comparison shall be made of tested performance to specified performance including calculation of variance from specified requirements.

G. In case of failure of any unit to meet the test requirements, the manufacturer, at his own expense, shall make such alterations as are necessary and the tests shall be repeated without additional cost to OWNER until the equipment is satisfactory.

H. Complete instrumentation layout and manufacturer's information for all instrumentation used during testing shall be submitted including the arrangement and device for flow measurement, conversion tables/graphs, and accuracies over the specified flow range. All instruments and measuring devices that the manufacturer proposes to use for shop performance testing shall be calibrated by a laboratory not more than twelve months prior to the first performance test.

I. The blower manufacturer shall prepare and submit test results, performance curves, and all calculations with a statement certifying that shop tests were successfully conducted in accordance with the test requirements and that all specified performance conditions were demonstrated for each blower system.

3.02 INSTALLATION AND FIELD TESTING

A. The CONTRACTOR shall furnish and install the blower packages and all related items in strict accordance with manufacturer's instructions including proper support and anchoring of the blowers. All supports, fasteners, anchors, equipment, hardware, etc. shall be furnished for a complete installation.

B. Grouting

1. Fill anchor bolt holes or sleeves with grout, after bolt alignment is proven, and prior to placing grout under equipment bases.

2. Surface Preparation. Roughen surface by chipping, removing laitance, and unsound concrete. Clean area of all foreign material such as oil, grease, and scale. Saturate area with water at least 4 hours prior to grouting, removing excess water ponds.

3. Application. Place grout after the equipment base has been set and its alignment and level have been approved. Form around the base, mix grout, and place in accordance with the grout manufacturers published instructions. Eliminate all air or water pockets beneath the base using a drag chain or rope.

4. Finishing. Point the edges of the grout to form a smooth 45 degree slope.

5. After grout has cured (not before 3 days after placement) paint exposed surfaces of grout with shellac.

6. Level Verification. After grout has cured, and immediately prior to drive alignment, recheck equipment for level and plumb. Re-level and square as necessary. Hold final checks for inspection and approval by Engineer.

C. Belt tensioning. Set drive belt tension to manufacturer's specification for the belt type. Recheck alignment after drive tensioning.

D. Alignment. Equipment shall be field tested to verify proper alignment, operation as specified, and freedom from binding, scraping, vibration, shaft runout, or other defects. Drive shafts shall be measured just prior to assembly to ensure correct alignment without forcing. Equipment shall be secure in position and neat in appearance.

E. Prior to field testing of blower equipment, the CONTRACTOR shall take all necessary precautions to insure that the air piping is completely clean and free of any debris, dirt, or other foreign materials which could clog the aeration equipment or interfere with acceptable operation.

F. After each blower unit and its accessories have been completely installed and the electrical connections have been made, it shall be subjected to field tests conducted by the CONTRACTOR and witnessed by the ENGINEER to determine if it is free from all objectionable vibration, bearing heating, noise, or other defects. Vibration shall not exceed 0.55 in/sec at any bearing in any plane. Sound pressure level shall be measured along each side of the enclosure to verify conformance to the requirements specified herein. Each blower unit shall be subjected to running tests under actual operating conditions for a period of 12 hours during the field test. The CONTRACTOR shall make such changes or alterations in the blower units or their ancillary components necessary for satisfactory operation as directed by the ENGINEER based on the results of the field tests.

G. Vibration testing shall be performed by an experienced factory-trained and authorized third-party analysis expert (not a sales representative) retained by the CONTRACTOR and approved by the Engineer. Each blower shall be tested separately without duplicate equipment running. The Engineer shall be furnished with four (4) certified copies of vibration test data for each test performed.

1. For systems with variable speed drives, tests shall be conducted at various speeds between maximum and minimum. For systems with two-speed drives, tests shall be conducted at both speeds. For systems with constant-speed drive, tests shall be conducted under various loading conditions as determined by the Engineer.

2. All field vibration tests shall be performed with the equipment operating on the product for which it is intended, or a substitute acceptable to the Engineer.

3. The term displacement, as used herein, shall mean total peak-to-peak movement of vibrating equipment, in mils; velocity or speed of the vibration cycle, measured in G's. Displacement and velocity shall be measured by suitable equipment equal to IRD Mechanalysis, Bentley, Nevada.

4. Frequency of vibration, in cycles per minute (cpm), shall be determined when vibration exceeds specified levels or as otherwise necessary. Vibration shall be measured on the bearing housing, unless other locations are deemed necessary by the vibration analysis expert and Engineer.

5. For all equipment tested, vibration shall be checked in the radial and axial directions. Unless otherwise specified elsewhere, axial vibration shall not exceed 0.1 in/sec; and radial vibration shall not exceed 0.2 in/sec.

6. Copies of test results shall be submitted to the Engineer for review. Should the vibration field test results exceed shop test results, the manufacturer's recommendations, or the limits specified herein, the CONTRACTOR shall correct the deficiencies within thirty (30) days. After corrections have been completed, the vibration testing shall be re-run and the results re-submitted to the Engineer for review.

7. Noise or vibration in any rotating equipment which the Engineer determines to be excessive or damaging and falls outside of the acceptable limits for that particular piece of equipment shall be cause for rejection.

3.03 PAINTING

A. Painting shall be as specified in Section 09900 unless otherwise specified herein. Blowers shall be coated with the manufacturer's recommended premium paint system suitable for the blowers' intended use.

B. Blower equipment and appurtenances shall be finished painted by the manufacturer. The equipment and motor shall be painted with a high quality epoxy polyamide semi-gloss coating specifically resistant to chemical, solvent, moisture, and acid environmental conditions, unless otherwise specified.

C. Gears, bearing surfaces, and other unpainted surfaces shall be protected prior to shipment by a heavy covering of rust-preventive compound sprayed or hand applied which shall be maintained until the equipment is placed in operation. This coating shall be easily removable by a solvent.

3.04 EQUIPMENT IDENTIFICATION

A. The blowers shall be provided with a substantial brass or stainless steel nameplate, securely fastened in a conspicuous place, and clearly inscribed with the manufacturer's name, year of manufacture, serial number, design air flow in scfm and icfm, discharge pressure and rpm.

B. Equipment names and tag numbers not currently identified in the Drawings and Specifications shall be provided to the CONTRACTOR prior to the fabrication of the nameplates. Coordinate name and number with same on remotely located controls, control panel, and other related equipment.

- END OF SECTION -

SECTION 15000

PIPING, GENERAL

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish and install to the required line and grade, all piping together with all fittings and appurtenances, required for a complete installation.

B. The Contractor shall furnish and install fittings, couplings, connections, sleeves, adapters, harness rods and closure pieces as required to connect pipelines of dissimilar materials and/or sizes herein included under this Section and other concurrent Contracts for a complete installation.

C. The Contractor shall furnish all labor, materials, equipment, tools, and services required for the furnishing, installation and testing of all piping as shown on the Drawings, specified in this Section and required for the Work. Piping shall be furnished and installed of the material, sizes, classes, and at the locations shown on the Drawings and/or designated in this Section. Piping shall include all fittings, adapter pieces, couplings, closure pieces, harnessing rods, hardware, bolts, gaskets, wall sleeves, wall pipes, hangers, supports, and other associated appurtenances for required connections to equipment, valves, or structures for a complete installation.

D. The work shall include, but not be limited to, the following:

1. Connections to existing pipelines.

2. Test excavations necessary to locate or verify existing pipe and appurtenances.

3. Installation of all new pipe and materials required for a complete installation.

4. Cleaning, testing and disinfecting as required.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01300 - Submittals

B. Section 02222 - Excavation and backfill for utilities

C. Section 03305 – Concrete and Grout

D. Section 05500 - Metal Fabrications

E. Section 09900 - Painting

F. Section 15995 - Pipeline Testing

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Commercial Standards

1.	ANSI B16.1	Cast Iron Pipe Flanges and Flanged Fittings, Class 125.
2.	ANSI B16.5	Pipe Flanges and Flanged Fittings, Steel Nickel Alloy and other Special Alloys.
3.	ANSI/AWS D1.1	Structural Welding Code.
4.	ASTM A 307	Specification for Carbon Steel Externally Threaded Standard Fasteners.
5.	ASTM A 325	Specification for High Strength Bolts for Structural Steel Joints.
6.	ASTM D 792	Test Methods for Specific Gravity and Density of Plastics by Displacement.

1.04 CONTRACTOR SUBMITTALS

A. The Contractor shall submit complete shop drawings and certificates, test reports, affidavits of compliance, of all piping systems, in accordance with the requirements in the Section entitled, "Submittals," and as specified in the individual piping sections.

B. Each shop drawing submittal shall be complete in all aspects incorporating all information and data listed herein and all additional information required to evaluate the proposed piping material's compliance with the Contract Documents. Partial or incomplete submissions will be returned to the Contractor without review.

C. Data to be submitted shall include, but not be limited to:

1. Catalog Data consisting of specifications, illustrations and a parts schedule that identifies the materials to be used for the various piping components and accessories. The illustrations shall be in sufficient detail to serve as a guide for assembly and disassembly.

2. Complete layout and installation drawings with clearly marked dimensions and elevations. Piece numbers which are coordinated with the tabulated pipe layout schedule shall be clearly marked. Piping layout drawings shall indicate the following additional information; pipe supports, support type and location, hanger rod size, insert type and the load on the hanger in pounds.

3. Weight of all component parts.

4. Tabulated pipe layout schedule which shall include the following information for all pipe and fittings: service, pipe size, working pressure, wall thickness and piece number.

D. Certifications: Prior to installation, the Contractor shall furnish an Affidavit of Compliance certified by the pipe manufacturer that the pipe, fittings and specials furnished under this Contract comply with all applicable provisions of AWWA and these specifications. No pipe or fittings will be accepted for use in the Work on this project until the affidavits have been submitted and accepted in accordance with Section 01300 entitled "Submittals."

E. All expenses incurred in making samples for certification of tests shall be borne by the Contractor.

1.05 QUALITY ASSURANCE

A. Tests: Except where otherwise specified, all materials used in the manufacture of the pipe shall be tested in accordance with the applicable Specifications and Standards.

B. Welding Requirements: All welding procedures used to fabricate pipe shall be prequalified under the provisions of ANSI/AWS D1.1. Welding procedures shall be required for, but not necessarily limited to, longitudinal and girth or spiral welds for pipe cylinders, spigot and bell ring attachments, reinforcing plates and ring flange welds, and plates for lug connections.

C. Welder Qualifications: All welding shall be done by skilled welders, welding operators, and tackers who have had adequate experience in the methods and materials to be used. Welders shall be qualified under the provisions of ANSI/AWS D1.1 by an independent local, acceptable testing agency not more than 12 months prior to commencing work. Machines and electrodes similar to those used in the Work shall be used in qualification tests. The Contractor shall furnish all material and bear the expense of qualifying welders. Furnish welder's qualification papers to the Engineer.

1.06 MANUFACTURER'S SERVICE REPRESENTATIVE

A. Where the assistance of a manufacturer's service representative is advisable, in order to obtain correct pipe joints, supports, or special connections, the Contractor shall furnish such assistance at no additional cost to the Owner.

1.07 MATERIAL DELIVERY, STORAGE, AND PROTECTION

A. All piping materials, fittings, valves, and accessories shall be delivered in a clean and undamaged conditions and stored off the ground, to provide protection against oxidation caused by ground contact. All defective or damaged materials shall be replaced with new materials.

1.08 CLEANUP

A. After completion of the work, all remaining pipe cuttings, joining and wrapping materials, and other scattered debris, shall be removed from the site. The entire piping system shall be handed over in a clean and functional condition.

PART 2 -- PRODUCTS

2.01 GENERAL

A. All pipes, fittings, and appurtenances shall be installed in accordance with the requirements of the applicable Sections of Division 2 and 15 and furnished as specified herein.

B. Pipe Supports: All pipes shall be adequately supported in accordance with the requirements of Section 15020 entitled "Pipe Supports," and as shown.

C. Lining: All requirements pertaining to thickness, application, and curing of pipe lining, shall be in accordance with the requirements of the applicable Sections of Division 15, unless otherwise specified.

D. Coating: All requirements pertaining to thickness, application, and curing of pipe coating, are in accordance with the requirements of the applicable Sections of Division 15, unless otherwise specified. Pipes above ground or in structures shall be field-painted in accordance with Section 09900 entitled "Painting."

E. All specials and every length of pipe shall be marked with the manufacturer's name or trademark, size, class, and the date of manufacture. Special care in handling shall be exercised during delivery, distribution, and storage of pipe to avoid damage and unnecessary stresses. Damaged pipe will be rejected and shall be replaced at the Contractor's expense. Pipe and specials stored prior to use shall be stored in such a manner as to keep the interior free from dirt and foreign matter.

F. Testing of pipe before installation shall be as described in the corresponding ASTM or AWWA Specifications and in the applicable standard specifications listed in the following sections. Testing after the pipe is installed shall be as specified in Section 15995, Pipeline Testing.

G. ALL BURIED EXTERIOR PIPING SHALL HAVE RESTRAINED JOINTS FOR THRUST PROTECTION UNLESS OTHERWISE SPECIFIED OR SHOWN ON THE DRAWINGS. ALL EXPOSED EXTERIOR PIPING SHALL HAVE FLANGED JOINTS, UNLESS OTHERWISE SPECIFIED OR SHOWN ON THE DRAWINGS.

H. The Contractor shall verify existing above ground and buried piping tie-in connections before fabricating new piping assemblies. The Contractor shall verify size, type, and location of all existing buried piping and appurtenances by excavating test pits as required of all buried connections and crossings which may affect the Contractor's work prior to ordering pipe and fittings to determine sufficient information for ordering materials. The Contractor shall take whatever measurements that are required to complete the work as shown or specified.

I. Before setting wall sleeves, pipes, castings and pipes to be cast in place, the Contractor shall check the Drawings and equipment manufacturer's drawings which may have a direct bearing on the pipe locations.

J. Piping shall be attached to blower packages in accordance with the respective manufacturers' recommendations. This includes the use of flexible connectors as required.

2.02 PIPE FLANGES

A. Flanges: Where the design pressure is 125 psi or less, flanges shall conform to either ANSI/AWWA C115/A21.15 Class D or ANSI B16.1 125-lb class. Where the design pressure is greater than 150 psi, up to a maximum of 250 psi, flanges shall conform to either ANSI/AWWA C115/21.15 or ANSI B16.1 250-lb class. Flanges shall have flat faces and shall be attached with bolt holes straddling the vertical axis of the pipe unless otherwise shown. Attachment of the flanges to the pipe shall conform to the applicable requirements of ANSI/AWWA 115/21.15. Flanges for miscellaneous small pipes shall be in accordance with the standards specified for these pipes.

B. Blind Flanges: Blind flanges shall be in accordance with ANSI/AWWA C207, or with the standards for miscellaneous small pipes.

C. Flange Coating: All machined faces of metal blind flanges and pipe flanges shall be coated with a temporary rust-inhibitive coating to protect the metal until the installation is completed.

D. Flange Bolts: If studs are required, they shall be in accordance with ASTM A 307, Grade B, with heavy hex nuts. Machine bolts shall normally be used on all flanged connections and shall be in accordance with ASTM A 307, Grade B, with heavy hex nuts. If studs are required, they shall extend through the nuts a minimum of 1/4-inch. All bolts and nuts shall be hot dipped galvanized and shall conform to Section 05500 entitled "Metal Fabrications."

E. Flange Gaskets: Gaskets for flanged joints shall be of materials as specified in piping sections. Blind flanges shall have gaskets covering the entire inside face of the blind flange and shall be cemented to the blind flange. Ring gaskets shall not be permitted.

F. Flange Gasket Suppliers shall be the following, or equal:

1. John Crane

2. Garlock

2.03 FLANGED COUPLING ADAPTERS

A. Flanged adapters shall be furnished as required and as shown on the Drawings.

B. Restraint System shall be:

1. Flanged adapters shall have a restraint system that utilizes a mechanical restraint, which is an integral part of the follower gland, which utilizes multiple single tooth wedges. Flange adapters shall meet requirements of ANSI/AWWA C111/A21.11 and AWWA C219. Wedges for ductile iron applications shall be heat treated and coated black. The mating flange shall be compatible with the existing pipe that is being connected to.

C. Pressure and service shall be the same as connected piping.

D. Rubber components shall be Viton and rated for temperatures of 300° F.

2.04 SLEEVE-TYPE COUPLINGS

A. Construction: Sleeve-type couplings shall be provided where shown, and shall be of similar material as the pipe, without pipe stop, and shall be of sizes to fit the pipe and fittings shown. The middle ring shall be not less than 1/4-inch in thickness and shall be either 5 or 7-inches long for standard steel couplings, and 16-inches long for long-sleeve couplings. The followers shall be single-piece contoured mill section welded and cold-expanded as required for the middle rings. They shall be of sufficient strength to accommodate the number of bolts necessary to obtain adequate gasket pressures without excessive rolling. The shape of the follower shall provide positive confinement of the gasket. Bolts and nuts shall conform to the requirements of Section 05500 entitled "Metal Fabrications."

B. Pipe Preparation: The ends of the pipe, where specified or shown, shall be prepared for sleeve-type couplings. Plain ends for use with couplings shall be smooth and round for a distance of 12-inches from the ends of the pipe, with outside diameter not more than 1/64-inch smaller than the nominal outside diameter of the pipe. The middle ring shall be tested by cold-expanding a minimum of one percent beyond the yield point, to proof-test the weld to the strength of the parent metal. The weld of the middle ring shall be subjected to an air test for porosity.

C. Gaskets: Gaskets for sleeve-type couplings shall be rubber-compound material that will not deteriorate from age or exposure to air under normal storage or use conditions. The rubber in the gasket shall meet the following specifications:

1. Color - Jet Black.

2. Surface - Nonblooming.

3. Durometer Hardness - 74 $\pm$ 5.

4. Tensile Strength - 1000 psi Minimum.

5. Elongation - 175 percent Minimum.

D. The gaskets shall be immune to attack by the material which is being transported. All gaskets shall meet the requirements of ASTM D 2000, AA709Z, meeting Suffix B13 Grade 3, except as noted above.

E. Insulating Couplings: Where insulating couplings are required, both ends of the coupling shall have a wedge-shaped gasket which assembles over a rubber sleeve of an insulating compound in order to obtain insulation of all coupling metal parts from the pipe.

F. Restrained Joints: Where harnesses are required for sleeve-type couplings, they shall be in accordance with the requirements of the appropriate reference standard, or as shown.

G. Supplier shall be the following, or equal:

1. Smith-Blair, Style 411.

2. Dresser, Style 38.

3. Ford Meter Box Co., Inc., Style FC1 or FC3.

2.05 REINFORCED FLEXIBLE PIPE COUPLING (EXPANSION JOINTS)

A. Reinforced flexible pipe couplings shall be single or multiple arch style No. 500 as manufactured by Mercer Rubber Company, or an equivalent model by General Rubber Co., Metraflex, Redvalve, or equal.

B. The couplings for air service shall be rated for a working pressure of 30 psig and shall be constructed of Nordel elastomer rated for a maximum temperature of 350° F. A hypalon coating shall be applied to the exterior of the elastomer.

C. All couplings shall have integrally molded flanges with split and beveled galvanized steel retaining rings. Galvanized steel washers shall be provided at the point where the rings are split. Bolt holes and bolt circle patterns shall conform to the mating flange patterns as specified in the piping paragraphs. Coupling lengths shall be manufacturer's standard, subject to Engineer's review and acceptance.

D. Control units shall be 316 stainless steel and shall be provided and installed with all flexible pipe couplings. The control unit shall be supplied by the coupling manufacturer.

E. Couplings shall have a filled arch for all applications with suspended solids above secondary effluent levels.

PART 3 -- EXECUTION

3.01 GENERAL

A. The Contractor shall furnish all labor, tools, materials, and equipment necessary for installation and jointing of the pipe. All piping shall be installed in accordance with the Drawings in a neat workmanlike manner and shall be set for accurate line and elevation. All piping shall be thoroughly cleaned before installation, and care shall be taken to keep the piping clean throughout the installation.

B. Before setting wall sleeves, pipes, castings and pipes to be cast in place, the Contractor shall check the Drawings and equipment manufacturer's drawings which may have a direct bearing on the pipe locations. The Contractor shall verify existing piping tie-in connections and verify size, type, and location before fabricating new piping assemblies.

C. Piping shall be attached to blower packages in accordance with the respective manufacturers' recommendations. This includes the use of flexible connectors as required.

D. All changes in directions or elevations shall be made with fittings, unless otherwise shown.

3.02 SHIPPING, HANDLING AND STORAGE

A. Special care in handling shall be exercised during delivery, distribution and storage of pipe to avoid damage and setting up stresses. Damaged pipe will be rejected and shall be replaced at the Contractor's expense. Pipe and specials stored prior to use shall be stored in such a manner as to keep the interior free from dirt and foreign matter.

B. No pipe shall be dropped from cars or trucks to the ground. All pipe shall be carefully lowered to the ground by mechanical means. In shipping, pipe and fittings shall be blocked in such manner as to prevent damage to castings or lining. Any broken or chipped lining shall be carefully patched. Where it is impossible to repair broken or damaged lining in pipe because of its size, the pipe shall be rejected as unfit for use.

C. All mechanical joint pipe shall be laid with 1/8-inch space between the spigot and shoulder of pocket.

3.03 LAYING PIPE

A. Proper and suitable tools and appliances for the safe convenient handling and laying of pipe shall be used and shall, in general, agree with manufacturer's recommendations. At the time of laying, the pipe shall be examined carefully for defects, and should any pipe be discovered to be defective after being laid, it shall be removed and replaced with sound pipe by the Contractor at his expense.

B. The Contractor shall perform all earthwork including excavation, backfill, bedding, compaction, sheeting, shoring and bracing, dewatering and grading in accordance with the Section 02222, "Excavation and Backfill for Utilities".

C. Upon satisfactory excavation of the pipe trench and completion of the pipe bedding, a continuous trough for the pipe barrel and recesses for the pipe bells, or couplings, shall be excavated by hand digging. When the pipe is laid in the prepared trench, true to line and grade, the pipe barrel shall receive continuous, uniform support and no pressure shall be exerted on the pipe joints from the trench bottom.

D. All piping 3-inches and larger shall be provided with mechanical joint just outside the limits of a building or tank wall unless a greater number of joints is shown on the Drawings.

E. Pipe shall be installed in accordance with the manufacturer's recommendation. Before being lowered into the trench, the pipes and accessories shall be carefully examined and the interior of the pipes shall be thoroughly cleaned of all foreign matter and other acceptable methods. At the close of each work day and during suspension of work for any reason at any time, a suitable stopper shall be placed in the end of the pipe last laid to prevent mud or other foreign material from entering the pipe.

F. Lines shall be laid straight and depth of cover shall be maintained uniform with respect to finish grade, whether grading is completed or proposed at time of pipe installation. Where a grade or slope is shown on the Drawings, the Contractor shall use laser based surveying instruments to maintain alignment and grade. At least one elevation shot shall be taken on each length of pipe and recorded. No abrupt changes in direction or grade will be allowed.

G. After pipe has been laid, inspected and found satisfactory, sufficient backfill shall be placed along the pipe barrel to hold the pipe securely in place during the conduction of the pressure test. No backfill shall be placed over the joints until the pressure tests is satisfactorily completed, leaving the joints exposed to view for the detection of visible leaks. Upon satisfactory completion of the pressure test, backfilling of the trench shall be completed. Pipe trenches may be backfilled prior to pressure testing subject to the permission of the Engineer.

H. All underground piping and fittings shall use thrust restrained joints.

3.04 FLANGED JOINTS

A. Flanged joints shall be made up with full face gaskets as specified in the piping paragraphs. Flange faces shall have a uniform bearing on the gaskets. Flanges shall be drawn together uniformly until the joint is tight. No washers shall be permitted for the bolt and nut assemblies. The length of the bolts shall be uniform and in accordance with the standards specified herein. The bolt's maximum projection beyond the end of the nut shall be 0.25-inch nor shall the bolt fall short of the end of the nut. All buried flanges shall be installed with 316 SS nuts and bolts.

3.05 WELDED JOINTS

A. Field welding shall be kept to a minimum. Field weld locations shall be approved by Engineer.

B. Field welding shall be provided by a company that can show at least 5 similar installations with stainless steel pipe field welding within the last year. Field welding shall be provided by St. Cloud Welding, National Welding Corporation, or approved equal

C. Field welding on stainless steel piping shall be per welding requirements in Section 15012, Stainless Steel Pipe

D. Field welds shall be "fixed position" type.

E. Buried pipe runs longer than 50 feet shall be provided with field welds every 20 feet that include bevels at field weld locations so that field welds can provide a slight angle to create a zig zag layout of the pipe within the pipe trench.

3.06 THRUST RESTRAINT

A. All sleeve type couplings shall be harnessed except where noted specifically on the Drawings. The harnessing shall be as shown on the Drawings or as specified herein.

B. Where the distance between adjacent flanges is in excess of ten feet or where a harness can not be used, the pipe supports adjacent to the coupling shall restrain the piping preventing any linear or angular movement resulting in the pipe separating from the coupling or misalignment in the joint.

C. Where expansion joints are used, control units shall be provided. All tie rods and control units shall be installed in accordance with the manufacturer's recommended procedures.

D. All buried tie rods and associated hardware shall be 316 stainless steel.

E. In general, all valves and fittings shall be restrained in an acceptable manner such that the unbalanced force developed at them shall be supported independent of the piping system.

3.07 PIPE SCHEDULE

A. This section includes schedule of piping specified in other sections of Division 15.

B. The following abbreviations are used in the schedule:

1. Material

304 SS - 304 Stainless Steel (nonwelded joints) or
304L Stainless Steel - low carbon (welded joints)
DI - Ductile Iron

2. Wall Thickness

CL - Class
PC - Pressure Class
Sch - Schedule
SDR - Standard Diameter Ratio

3. Joint Type

FLG - Flanged
PO - Push on Joint
RJ - Restrained Joint
VIC - Victaulic
WId - Welded

4. Fitting Type

304 SS - 304 Stainless Steel (nonwelded joints) or
304L Stainless Steel - low carbon (welded joints)
DI - Ductile Iron

5. Interior Surface Protection

AC - Asphalt Coated
NA - No Interior Coating Required

6. Exterior Surface Protective Coating

AC - Asphalt Coated (below ground only)
P - Painted (above ground only)
Z - Zinc Coated (below ground only)

PIPE SCHEDULE

Service	Nominal Pipe Diameter (Inches)	Material	Thickness Class or Schedule	Working Pressure (PSIG)	Type of Joints	Type of Fittings	Protective Coating		Remarks
							Interior	Exterior	
REAERATION AIR (RA)									
Above Ground	All	304 SS	SCH 10S	7	FLG/Wld	304 SS	NA	NA	"HOT" warning added. See 15012
Below Ground	All	304 SS	SCH 10S	7	FLG/Wld	304 SS	NA	NA	See 15012

- END OF SECTION –

SECTION 15012

STAINLESS STEEL PIPE

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Stainless steel pipe and fittings shall conform to ASTM-A778 and ASTM A774 for nominal pipe sizes 1/4-inch and larger. Stainless steel pipe shall be new and shall meet or exceed the manufacturer and material requirements of ASTM A240.

B. All parts of the materials furnished shall be amply designed, manufactured and constructed for the maximum stresses occurring during fabrication and erection. All materials shall be new and both workmanship and materials shall be of the very best quality, entirely suitable for the service to which they will be subjected and shall conform to all applicable sections of these Specifications. Manufacturer's designs shall accommodate all the requirements of these Specifications.

C. Reference Section 15000 entitled "Piping, General".

PART 2 -- PRODUCTS

2.01 STAINLESS STEEL PIPE AND FITTINGS (PROCESS AIR)

A. Stainless steel piping for process air piping of nominal sizes ranging from three (3) inches to sixty (60) inches shall be manufactured from ASTM A240 annealed and pickled sheets and plates and fabricated in accordance with ASTM A778 in Type 304L stainless steel. Only stainless steel pipe shall be provided; tubing shall not be allowed. Stainless steel pipe, at a minimum, shall be service rated for 300°F at 25 psig. Stainless steel pipe shall be as manufactured by Douglas Brothers, Felker Bros. Corp., or equal.

B. The following information shall be provided:

1. An affidavit of compliance is required from the pipe manufacturers.

2. The steel manufacturer's certification that the material meets the ASTM specification will be accepted in lieu of tests on specimens taken from fabricated pipe.

3. The fabricator may purchase steel plates on the chemical basis only, and shall furnish to the Owner certified test reports.

4. Only seamless or one (1) longitudinal seam shall be permitted unless otherwise required for fabrication of large diameter pipe in accordance with ASTM A774.

5. Joints in piping 3-inches in diameter or larger shall be butt welded or flanged, unless otherwise shown on the Drawings. Joints in piping less than 3-inch diameter shall be threaded, unless otherwise shown on the Drawings.

C. Fittings shall be fabricated from the pipe specified and shall conform to ASTM A774, unless otherwise shown on the Drawings or required for proper installation.

D. Flanges where shown on the Drawings shall be a lap joint flange assembly consisting of a 304L stainless steel slip-on rolled angle ring with a 304L stainless steel drilled back up flange conforming to ASTM A240, and shall conform dimensionally conforming to ANSI B16.1, Class 125. Hardware shall be stainless steel per ANSI B18.2, type and grade to prevent galling. The angle of leg shall not interfere with the flange bolt holes. Alternately, slip-on plate flanges conforming to ANSI B16.1, Class 125 are acceptable at specific locations as approved by the Engineer. The plate flange shall be continuously welded to the pipe.

E. Bolts and Nuts: Provide hexagonal head and bolts and nuts. Size and length in accordance with the "American Standard" and comply with the requirements of the ANSI/AWWA Standards. The bolts for flanged joints shall be per ANSI B 18.2, stainless steel, type and grade to prevent galling. No washers shall be used.

F. The back-up flanges and plate flanges shall be supplied with the following nominal thicknesses.

Nom. Pipe Size (in.)	Flange Thickness (in.)
2-1/2 - 3	½
4	9/16
6 - 10	5/8

G. Gaskets for process air, all gaskets shall be 1/8-inch minimum thickness and shall be of a material suitable for 300°F continuous service at 25 psig. Dielectric gasket material service rated for 300°F continuous service at 25 psig shall be provided at all transitions to material other than mild steel.

H. Welding practices for joints shall conform to those specified for the manufacture of the pipe and fittings in ASTM A774 and A778, and the specifications contained herein. All welds shall be free from burrs, snags or rough projections.

I. Welding shall be performed by AWS certified welders in conformance with standard procedures. Piping with wall thickness up to 11 gauge (0.125") shall be welded with the TIG (GTAW) process. Heavier walls shall be properly beveled and have a root pass with the TIG (GTAW) process followed by subsequent passes with the TIG (GTAW), MIG (GMAW), or Metallic Arc (SMAW) process. Filler wire of ELC grades only shall be added to all welds to provide a cross section at the weld equal to or greater than the parent metal. Weld deposit shall be greater than the parent metal. Weld deposit shall be smooth and evenly distributed and have a crown of no more than 1/16 inch on the I.D. and 3/32 inch on the O.D. of the piping or fittings. Concavity, undercut, cracks or crevices shall not be allowed. Butt-welds shall have full penetration to the interior surface, and inert gas shielding shall be provided to the interior and exterior of the joint. Excessive weld deposits, slag, spatter and projections shall be removed by grinding. Angle face rings shall be

continuously welded on both sides to the pipe or fitting. Welds on gasket surfaces shall be ground smooth.

J. All fittings shall be welded with 304L filler metal. All elbows through 24 inch size shall be long radius, die formed and shall be automatically butt welded in accordance with ASTM A774 of the same material and thickness as the pipe, using gas tungsten-arc procedures with inert gas backing. Tees, crosses, true Y's and laterals shall be shop fabricated. All reducers shall be straight tapered, cone type. Longitudinal welds on all fittings, except elbows, shall be accomplished by the same procedures as listed for pipe. Weld seams shall have full penetration and be free of oxidation, crevices, pits, cracks and protrusions. Fitting dimensions shall be in accordance with ANSI B16.9, and shall be terminated and dimensioned as indicated on the Drawings.

K. Pipe spools shall be manually welded with 304L filler metal, using gas tungsten-arc procedures with internal gas purge where internal weld seams are not accessible. Where they are accessible, seams shall be welded both inside and outside, using manual shielded metal-arc procedures. Weld seams shall have full penetration and be free of oxidation, crevices, pits, cracks and protrusions.

L. All pipe, fittings and spools shall be completely pickled and passivated by immersion in a nitric-hydrofluoric bath at the proper temperature and length of time to insure removal of all free iron, weld scale and other impurities and to insure the establishment of a passive surface. A clean water rinse shall follow the acid pickle.

M. The field testing procedure for process air piping shall use air pressure only.

N. The inspection of all welds shall be required. This shall be a visual inspection for crevices, pits, cracks, protrusions and oxidation deposits. Presence of any of these items found in the weld seams shall be considered as grounds for rejection of the joint.

O. All fabricated piping shall have openings plugged and flanges secured for storage and/or transport after fabrication. All fabricated piping shall be piece marked with identifying numbers or codes which correspond to the Contractor's layout and installation drawings. The marks shall be located on the spools at opposite ends and 180 degrees apart.

P. The piping supplier during manufacturing, fabrication and handling stages, and the Contractor during handling and installation stages, shall use extreme care to avoid the contact of any ferrous materials with the stainless steel piping. Only manufacturer recommended saws, drills, files, wire brushes, etc. shall be used for stainless steel piping. Pipe storage and fabrication racks shall be non-ferrous or stainless steel or rubber lined. Nylon slings or straps shall be used for handling stainless steel piping. Contact with ferrous items may cause rusting of iron particles embedded in the piping walls. After installation, the Contractor shall wash and rinse all foreign matter from the piping surface. If rusting of embedded iron occurs, the Contractor shall pickle the affected surface with Oakite Deoxidizer SS or equal, scrub with stainless steel brushes and rinse clean.

Q. Process air pipe shall be manufactured to nominal pipe sizes as listed in ANSI B36.19, Table 2, <u>and shall have the following minimum wall thicknesses</u>: Schedule 10S

R. All parts of the materials furnished shall be amply designed, manufactured and constructed for the maximum stresses occurring during fabrication and erection. All materials shall be new and both workmanship and materials shall be of the very best quality, entirely suitable for the service to which they will be subjected and shall conform to all applicable sections of these Specifications. Manufacturer's designs shall accommodate all the requirements of these Specifications.

S. The Contractor shall be responsible for the structural design of the stainless steel pipe, fittings and couplers. The Contractor shall submit certification that the stainless steel pipe, fittings and couplers have been designed to resist all loads implied and reasonably anticipated.

PART 3 -- EXECUTION

3.01 PRESSURE TESTING

A. Perform pressure testing for leakage in accordance with requirements of section 15995, “Pipeline Testing”.

- END OF SECTION -

SECTION 15020

PIPE SUPPORTS

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall provide all tools, supplies, materials, equipment, and all labor necessary for the furnishing, construction, and installation of all pipe supports, hangers, guides, and anchors shown, specified, or required for a complete and operable piping system, in accordance with the requirements of the Contract Documents.

1.02 CONTRACTOR SUBMITTALS

A. Shop Drawings: The Contractor shall furnish, prior to fabrication or installation, complete shop drawings of all pipe supports, hangers, anchors, and guides, as well as calculations for special supports and anchors, in accordance with Section 01300 entitled “Submittals”.

B. Provide line drawings of each piping system to the scale shown in the Drawings, locating each support or hanger. Identify each type of hanger or support by the manufacturer's catalog number or figure.

C. Provide installation drawings and manufacturer's catalog information on each type of hanger and support used. Clearly indicate the actual pipe outside diameter (not just nominal pipe size) that is used for the hangers and supports.

PART 2 -- PRODUCTS

2.01 GENERAL REQUIREMENTS

A. The Contractor shall note that all pipe support locations are not shown on the Drawings, and he shall follow the Specifications herein in locating supports. Where deviations and modifications are required, they shall be made subject to review by the Engineer.

B. Code Compliance: All piping systems and pipe connections to equipment shall be properly supported, to prevent undue deflection, vibration, and stresses on piping, equipment, and structures. All supports and parts thereof shall conform to the requirements of ANSI/ASME B31.1 and ANSI / ASME B31.3, except as supplemented or modified by these Specifications. Supports for plumbing piping shall be in accordance with the latest edition of the applicable plumbing code, or local administration requirements.

C. All piping shall be rigidly supported from the building structure by approved hangers, inserts, or supports. No piping shall be supported from other piping or from metal stairs, ladders, and walkways unless specifically permitted by the Engineer.

D. Unless otherwise indicated on the Drawings, piping supports shall consist of concrete piers or fabricated Type 316 stainless steel supports as specified below. Materials and workmanship shall be in full compliance with Division 3, Concrete of these Specifications.

E. Supporting appurtenances shall be arranged to prevent undue stress on equipment to which piping is connected. Supporting appurtenances shall provide the desired pitch as specified or required for proper drainage of the piping. The pipe suspension shall prevent excessive stress, excessive variation in supporting force, and possible resonance with imposed vibration while the system is in operation. All valves and valve operators shall be rigidly supported independently of the piping. Vertical runs of pipe shall be supported independently of the connected horizontal runs. All vertical pipes shall be supported at each floor or at intervals of at least ten (10) feet by approved pipe collars, clamps, brackets or wall rests. Supporting appurtenances, when used with copper piping, shall be copper, bronze or bronze plated. All piping shall be supported independently of the equipment to which it is connected. All in-line devices (flow meters, etc.) shall be removable without the need for temporary supports for adjacent and connecting piping.

F. For all couplings, supports shall be placed on each side and as close to the coupling as possible.

G. Structural Members: Wherever possible, pipes shall be attached to structural members. Where it is necessary to frame structural members between existing members, such supplementary members shall be provided by the Contractor at no additional cost to the Owner. All supplementary members shall be in accordance with the requirements of the appropriate building code and the American Institute of Steel Construction. Stainless steel and non-metallic piping installed in tanks, channels or conduits shall be supported by hangers, hanger rods, hardware and inserts fabricated of Type 316 stainless steel.

H. Freestanding pipe connections to equipment shall be firmly attached to fabricated Type 316 stainless steel frames made of angles, channels, or I-beams anchored to the structure. Exterior, freestanding overhead piping shall be supported on fabricated Type 316 stainless steel pipe stands, consisting of pipe columns anchored to concrete footings, with horizontal, welded angles and U bolts or clamps, securing the pipes. All materials shall be Type 316 stainless steel.

I. Point Loads: Any meters, valves, heavy equipment, and other point loads on PVC, fiberglass, and other plastic pipes shall be supported on both sides according to manufacturer's recommendations to avoid undue pipe stresses and failures. To avoid point loads, all supports on plastic and fiberglass piping shall be equipped with extra wide pipe saddles or Type 316 stainless steel shields with minimum length equal to circumference of pipe.

J. Where a specific pipe support is called for on the Drawings, this support shall be used as and where indicated for the specific application. In general, spacing of supports shall be as specified herein unless specifically modified by the Engineer.

K. All supports, saddles, bearing plates, and hangers, shall support by direct contact the pipe a minimum of 120 degrees around, except as specified herein.

L. Wherever expansion and contraction of piping is expected, a sufficient number of expansion loops or joints shall be provided together with the necessary rolling or sliding supports, anchors, guides, pivots, and restraints. They shall permit the piping to expand and contract freely in directions away from the anchored points and shall be structurally suitable to withstand all loads imposed. Pipes subject to thermal expansion shall be installed perfectly aligned and concentrically guided. These piping support systems shall be submitted to the Engineer for review prior to erection and installation. The submittal shall show locations of anchors, concentric pipe guides and expansion couplings (single or double).

2.02 PIPE SUPPORT SPACING

A. Supports for piping with the longitudinal axis in approximately a horizontal position shall be spaced to prevent excessive sag, bending and shear stresses in the piping, with special consideration given where components, such as flanges and valves, impose concentrated loads.

B. The distance between supports for each size of pipe shall not exceed those listed in the attached schedule. However, if the pipe size to be supported is not listed in the schedule, the next smaller nominal pipe size spacing shall be used. In all cases, there shall be a minimum of one (1) support per laying length of pipe on uninterrupted horizontal runs. This support shall be placed within one (1) foot of the joint. If the pipe manufacturer recommends a smaller spacing interval than specified herein, then the manufacturer's spacing shall be used.

C. The distance between supports shall not exceed that listed in the following schedule unless otherwise indicated on the Drawings:

Nominal Pipe Size (in.)	Metallic Piping (ft.)
4 and larger	10

2.03 SADDLES

A. Pipe saddles shall be used to cradle horizontal piping when being supported from below except where expansion of pipe requires rollers. All saddles shall be capable of being adjusted after installation.

2.04 BASE ELBOWS, TEES AND CONCRETE PEDESTALS

A. Base elbows, tees and concrete pedestals shall be provided at the locations shown on the Drawings and as specified. All vertical runs of pipe shall be supported on a base elbow and/or concrete pedestal. After completion of curing of the concrete pedestal, the piping shall be adjusted to the proper grade.

2.05 THRUST RESTRAINT

A. Pipe anchors shall be spaced to divide pipe into sections. Anchors shall be located at valves, changes in direction of piping, and major branch connections. Anchors shall be of a type recommended by the pipe manufacturer and reviewed by the Engineer.

B. On all piping where sleeve type couplings and flanged adapters are located near fittings or valves, tie rods shall span across the coupling as specified herein to restrain movements of the pipe along its axial direction. Such restraints can be deleted if both ends of the pipe are anchored in a concrete structure with no fitting or valve occurring within the span length, in the suction piping to a pump where the coupling is between the pump and valve, or when the water pressure measured at the crown of the pipe is less than five (5) feet.

C. All sleeve type couplings shall be harnessed except where noted. The harnessing shall be as shown on the Drawings or as specified herein. Harnesses for steel pipe shall be in accordance with AWWA Manual M11 for the pipe size and pressure, working or test whichever is greater.

D. Harnesses for ductile iron pipe shall be tie rods spanning between adjacent flanges. Friction clamps shall not be permitted. The size and number of tie rods shall be the same as for steel pipe for the same pressure and pipe size.

E. Where the distance between adjacent flanges is in excess of ten (10) feet or where a harness cannot be used, the pipe supports adjacent to the coupling shall restrain the piping preventing any linear or angular movement resulting in the pipe separating from the coupling or misalignment in the joint.

F. Where expansion joints are used, control units shall be provided. All tie rods and control units shall be installed in accordance with the manufacturer's recommended procedures.

G. Tie rods and associated hardware shall be Type 316 stainless steel.

H. In general, all valves and fittings shall be restrained in an approved manner such that the unbalanced force developed at them shall be supported independent of the piping system.

2.06 MANUFACTURED SUPPORTS

A. Stock Parts: Where not specifically shown or detailed, designs generally accepted as exemplifying good engineering practice, stock or production parts shall be utilized wherever possible. Such parts shall be locally available, new, of best commercial quality, designed and rated for the intended purpose.

B. Suppliers, or equal:

1. Basic Engineers, Pittsburgh, PA;

2. Bergen Paterson Corp., Boston, MA;

3. Elcen Metal Products Company, Franklin Park, IL;

4. Anvil International, Inc., Portsmouth, NH;

5. NPS Industries, Inc., Secaucus, NJ;

6. Unistrut Corp., Itasca, IL.

7. ITT-Grinnell Corp., Warren, OH;

2.07 ANCHOR BOLTS AND SCREWS

A. Anchor bolts and screws for attaching pipe supports and hangers to walls, floors, ceilings, and roof beams shall be Type 316 stainless steel, ASTM A 276. Nuts shall be Type 316 stainless steel, ASTM A 194, Grade 8M, or ASTM F 594, Type 316 stainless steel.

PART 3 -- EXECUTION

3.01 INSTALLATION

A. General: All pipe supports, hangers, brackets, anchors, guides, and inserts shall be fabricated and installed in accordance with the manufacturer's printed instructions and ANSI/ASME B31.1 and ANSI / ASME B31.3.

B. Appearance: Pipe supports shall be positioned in such a way as to produce an orderly, neat piping system.

C. Pipe Support Spacing: The distance between supports for each size of pipe shall not exceed those specified in Paragraph 2.02.

D. Provide separate supports at each valve. Provide one support around each end of the valve body or on the adjacent connecting pipe within one (1) pipe diameter of the valve end. Provide additional hangers or supports to relieve eccentric loadings imposed by offset actuators.

E. Provide separate supports at each pipe elbow, tee, or fitting. Provide separate hangers or supports on both sides of each non-rigid joint or flexible pipe coupling.

F. Install piping without springing, forcing, or stressing the pipe or any connecting valves, pumps, and other equipment to which the pipe is connected.

3.02 FABRICATION

A. Quality Control: Pipe hangers and supports shall be fabricated and installed by experienced welders and fitters using the best welding procedures available. Welding

shall conform with Section 05500 entitled “Metal Fabrications”. Fabricated supports shall be neat in appearance without sharp corners, burrs, and edges.

- END OF SECTION –

SECTION 15030

PIPING AND EQUIPMENT IDENTIFICATION SYSTEMS

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish and install all components of the system for identification of piping and equipment as specified hereinafter. The system shall include the application of color coding to all new and altered plant piping. The Contractor shall paint the equipment and piping of all Contracts in the colors herein specified, and in accordance with the requirements of Section 09900, Painting.

B. In addition to the legends specified herein the Engineer may order the Contractor to furnish and install additional identification legends and arrows at no additional cost to the Owner. Such additional signs may be requested near completion of the work and shall be limited to no more than five (5) signs for each type specified herein. The legends and color combinations for additional signs shall conform to the requirements specified herein.

C. The Contractor shall submit a schedule of the colors and designations proposed in accordance with Section 01300, Submittals, and this Section. A minimum of four (4) color charts with cross-references to the colors listed herein shall be included with the Submittal.

D. Reference Section 15000, Piping, General.

1.02 SUBMITTALS

A. The Contractor shall submit shop drawings and manufacturer's product literature in accordance with Section 01300 entitled "Submittals", and Section 01600 entitled "Materials and Equipment" and this Section. In addition, the Contractor shall submit with the shop drawings, a schedule of the colors and designations proposed for each service. A minimum of four (4) color charts with cross-references to the colors and services listed herein shall be included with the submittal. The Owner shall select the final color for each service during shop drawing review.

PART 2 -- PRODUCTS

2.01 PIPING BAND

A. All new and altered piping shall receive identification bands. Such bands shall be 6-inches wide, neatly made by masking, and spaced at intervals of 30-inches on centers regardless of the diameter of the pipe being painted. The Contractor may use approved precut and prefinished metal bands on piping, in lieu of the masked and painted bands, where approved by the Engineer. Banding colors shall be as indicated in Article 2.03.

2.02 PIPING IDENTIFICATION LEGEND

A. The Contractor shall apply identification legends to all types and sections of piping as shown on the Drawings or as designated by the Engineer. Such legends shall be in the form of plain block lettering giving the name of the pipe content in full or abbreviated form, and showing the direction of flow by arrows.

B. All lettering and arrows shall be of the vinyl, self-adhesive tape type or the plastic snap-on/strap-on type with self-gripping fasteners. Pipe marking devices (i.e., tape or snap-on/strap-on type) shall be suitable for a 5 to 8-year outdoor life without discoloration. Pipe marking devices shall be as manufactured by Lab Safety Supply, or equal.

C. All lettering and arrows shall have an overall height in inches in accordance with Table 15030-1.

Table 15030-1
Height of Pipe Lettering

Diameter of Pipe or Pipe Covering	Height of Lettering
4 to 6 inches	1 1/4 inches
8 inches	2 1/2 inches

D. Identification lettering shall be located midway between color coding bands where possible. Identification lettering and arrows shall be placed as directed by the Engineer, but shall generally be located each fifteen (15) feet in pipe length, and shall be properly inclined to the pipe axis to facilitate easy reading. Lettering shall also appear directly adjacent to each side of any wall or slab the pipeline passes through, with a minimum of two (2) titles on each pipe in one structure. Identification lettering shall be located midway between color coding bands where possible.

E. Lettering, background and arrow colors shall be the manufacturer's standard colors unless otherwise directed by the Engineer.

F. The manufacturer's instructions shall be followed in respect to storage, surface preparation and application.

G. Pipe lettering shall for each service type shall be as indicated in Article 2.03.

H. The colors referenced in the legend are as manufactured by KOP-COAT. They are used for convenience only.

2.03 PIPING AND EQUIPMENT IDENTIFICATION SCHEDULE

A. Equipment colors, pipe lettering, piping colors shall generally be as indicated in Table 09900-2. The Contractor shall provide the colors selected by the Owner from the submitted painting manufacturer's color charts during shop drawing review.

B. Additional identification information provided in the piping schedule of Specification 15000.

PART 3 -- EXECUTION

(NOT USED)

– END OF SECTION –

SECTION 15095

VALVES, GENERAL

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish and install, complete with all assemblies and accessories, all valves shown on the Drawings and specified herein including all fittings, appurtenances and transition pieces required for a complete and operable installation.

B. The Contractor shall provide all tools, supplies, materials, equipment, and labor necessary for furnishing, epoxy coating, installing, adjusting, and testing of all valves and appurtenant work, complete and operable, in accordance with the requirements of the Contract Documents.

C. The provisions of this Section shall apply to all valves and valve operators specified in the various Sections of these Specifications except where otherwise specified in the Contract Documents. Valves and operators in particular locations may require a combination of units, sensors, limit switches, and controls specified in other sections of these Specifications.

D. The equipment covered by these specifications is intended to be standard equipment of proven performance as manufactured by reputable companies. Equipment shall be designed, constructed and installed in accordance with the best practice of the trade, and shall operate satisfactorily when installed as shown on the Drawings.

1.02 SUBMITTALS

A. Each submittal shall be complete in all aspects incorporating all information and data listed herein and all additional information required to evaluate the proposed valve's or hydrant's compliance with the Contract Documents. Partial or incomplete submissions shall be returned to the Contractor disapproved without review.

B. Shop Drawings conforming to the requirements of Section 01300, Submittals, are required for all valves, and accessories. Submittals shall include all layout dimensions, size and materials of construction for all components, information on support and anchoring where necessary, pneumatic and hydraulic characteristics and complete descriptive information to demonstrate full compliance with the Documents.

C. Data to be submitted shall include but not be limited to:

1. Catalog data consisting of specifications, illustrations and a parts schedule that identifies the materials to be used for the various parts and accessories. The illustrations shall be in sufficient detail to serve as a guide for assembly and disassembly.

2. Complete assembly and installation drawings with clearly marked dimensions. This information shall be in sufficient detail to serve as a guide for assembly and disassembly and for ordering parts.

3. Weight of all component parts and assembled weight.

4. Design calculations.

5. Listing of all lubricants required for the equipment with a minimum of two equivalent and compatible natural and/or synthetic lubricants produced by different manufacturers. The listing shall include the estimated quantity of lubricant required for one year of operation.

6. Sample data sheet of equipment nameplate(s) including information contained thereon.

7. Spare parts list

8. Special tools list

D. Operation and maintenance manuals and installation instructions shall be submitted for all valves and accessories in accordance with the Specifications. The manufacturer(s) shall delete all information which does not apply to the equipment being furnished.

E. Valve Labeling: The Contractor shall submit a schedule of valves to be labeled indicating in each case the valve location and the proposed wording for the label.

1.03 CONTRACTOR'S RESPONSIBILITIES

A. The Contractor shall provide the services of a qualified representative of the manufacturer(s) to check out and certify the installation, to supervise the initial operation, and to instruct the Owner's operating personnel in proper operation and maintenance procedures in accordance with the following schedule (the table below does not replace requirements from specific equipment specifications):

Service	**Number of Trips**	**Number of Days/Trip**
Installation and Testing	1	1

B. Any additional time required to achieve successful installation and operation shall be at the expense of the Contractor. The manufacturer's representative shall sign in and out at the office of EWRF.

C. A written report covering the representative's findings and installation approval shall be mailed directly to the Engineer covering all inspection and outlining in detail any deficiencies notes.

D. The times specified are exclusive of travel time to and from the facility and shall not be construed as to relieve the manufacturer of any additional visits to provide sufficient service to place the equipment in satisfactory operation.

E. Valve Testing: Unless otherwise specified, each valve body shall be tested under a test pressure equal to twice its design water-working pressure.

F. Bronze Parts: Unless otherwise specified, all interior bronze parts of valves shall conform to the requirements of ASTM B62, or, where not subject to dezincification, to ASTM B 584.

G. The Contractor shall obtain from the manufacturer and submit to the Engineer copies of the results of all certified shop tests.

H. The Contractor shall obtain from the manufacturer and submit to the Engineer copies of certified letters of compliance in accordance with the General Conditions and Division 1.

PART 2 – PRODUCTS

2.01 VALVES

A. All valves shall be constructed of first quality materials which have strength, wearing, and corrosion resistance characteristics entirely suitable for the types of service for which the individual valves are designated. Except where noted otherwise, valves designated for water service shall conform to pertinent sections of the latest revision of AWWA C500 Specifications. Cast iron valve bodies and parts shall meet the requirements of the latest revision of ASTM Designation A-126, "Standard Specifications for Gray Iron Castings for Valves, Flanges, and Pipe Fittings, Class B.". Flanged ends shall be flat-faced and have bolt circle and bolt patterns conforming to ANSI B16.1 Class 125 unless otherwise specified hereinafter.

B. All valve body castings shall be clean, sound, and without defects of any kind. No plugging, welding, or repairing of defects will be allowed.

C. Valves shall have flanged ends for exposed service and mechanical joint ends for buried service, unless otherwise shown on the Drawings or specified herein. Flanged ends shall be flat-faced, 125 lb. American Standard unless otherwise shown or specified in accordance with ANSI B16.1. All bolt heads and nuts shall be hexagonal of American Standard size. The Contractor shall be responsible for coordinating connecting piping. Valves with screwed ends shall be made tight with Teflon tape. Unions are required at all screwed joint valves.

D. Gaskets shall be full face and made of natural or synthetic elastomers in conformance with ANSI B16.21 suitable for the service characteristics, especially chemical compatibility and temperature. Nonferrous alloys of various types shall be used for parts of valves as specified. Where no definite specification is given, the material shall be the recognized acceptable standard for that particular application.

E. All shut-off valves, 6 inches and larger, shall have operators with position indicators.

F. All valves shall have a minimum design pressure rating of 150 psi and capable of a test pressure of 300 psi. For service applications with pressures in excess of 150 psi, valves shall have a minimum pressure rating in excess of the service application working pressure.

2.02 VALVE FLANGE

A. The flanges of valves shall be in accordance with Section 15000 entitled "Piping, General."

2.03 PROTECTIVE COATING

A. Except where otherwise specified, ferrous surfaces, exclusive of stainless steel surfaces, in the air passages of all valves 4 inches and larger, as well as the exterior surfaces of all submerged valves, shall receive a fusion bonded epoxy coating in accordance with AWWA C550. Flange faces of valves shall not be epoxy coated. The Contractor, through the valve manufacturer, shall certify in writing that such coating has been applied and tested in the manufacturing plant prior to shipment, in accordance with these Specifications.

2.04 VALVE LABELING

A. A label shall be provided on all shut-off valves exclusive of hose bibbs. The label shall be of 1/16-inch plastic or stainless steel, minimum 2 inches by 4 inches in size, and shall be permanently attached to the valve or on the wall adjacent to the valve or as indicated by the Engineer.

PART 3 -- EXECUTION

3.01 INSTALLATION

A. Except where noted otherwise herein, all valves shall be installing and tested in accordance with the latest revision of AWWA C500. Before installation, all valves shall be lubricated, manually opened and closed to check their operation and the interior of the valves shall be thoroughly cleaned. Valves shall be placed in the positions shown on the Drawings. Joints shall be made as directed under the Piping Specifications. The valves shall be so located that they are easily accessible for operating purposes, and shall bear no stresses due to loads from the adjacent pipe. The Contractor shall be responsible for coordinating connecting piping.

B. All valves shall be tested at the operating pressures at which the particular line will be used. Any leakage or "sweating" of joints shall be stopped, and all joints shall be tight. All motor operated and cylinder operated valves shall be tested for control operation as directed by the Engineer.

C. Provide valves in quantity, size, and type with all required accessories as shown on the Drawings.

D. Install all valves and appurtenances in accordance with manufacturer's instructions. Install suitable corporation stops at all points shown or required where air binding of pipe lines might occur. Install all valves so that operating handwheels or wrenches may be conveniently turned from operating floor but without interfering with access, and as approved by Engineer. Unless otherwise approved, install all valves plumb and level.

Valves shall be installed free from distortion and strain caused by misaligned piping, equipment or other causes.

E. The procedures regarding unloading, inspection, storage and where applicable installation, described in the Appendix of AWWA C500 entitled "Installation, Operation and Maintenance of Gate Valves," shall be used for all valves.

F. All valves shall be manually opened and closed before installation to check their operation, and the interior of the valves shall be cleaned. Valves shall be placed in the positions shown on the Drawings. Joints shall be made as directed under the piping specifications.

G. Access: All valves shall be installed to provide easy access for operation, removal, and maintenance and to avoid conflicts between valve operators and structural members or handrails.

H. Valve Accessories: Where combinations of valves, sensors, switches, and controls are specified or shown on the Drawings, it shall be the responsibility of the Contractor to properly assemble and install these various items so that all systems are compatible and operating properly. The relationship between interrelated items shall be clearly noted on shop drawing submittals.

3.02 VALVE SUPPORTS

A. Valves shall be supported as integral components of the piping systems.

B. All horizontally mounted valve operators, manual, pneumatic or electric, whose weight exceeds 25 pounds shall be supported independently of the valve and piping system.

C. Valve supports shall anchor the valves against an unbalanced force in either direction. The magnitude of the force shall be based on a pressure equal to twice the maximum working pressure with a maximum allowable stress of one half of the support's yield strength.

3.03 SHOP AND FIELD TESTING

A. Shop and field testing of valves shall be as follows:

1. Certified factory testing shall be provided for all components of the valve and operator system. Valves and operators shall be shop tested in accordance with the requirements in the latest revision of AWWA C500, including performance tests,
leakage test, hydrostatic tests, and proof-of-design tests. The manufacturer through the Contractor shall submit certified copies of the reports covering the test for acceptance by the Engineer.

2. Shop testing shall be provided for the operators consisting of a complete functional check of each unit. Any deficiencies found in shop testing shall be corrected prior to shipment. The system supplier through the Contractor shall submit written certification that shop tests for the electrical/pneumatic system and all controls were successfully conducted and that these components provide the functions specified and required for proper operation of the valve operator system.

3. The Contractor shall conduct field tests to check and adjust system components, and to test and adjust operation of the overall system. Preliminary field tests shall be conducted prior to start-up with final field tests conducted during start-up. The factory service representative shall assist the Contractor during all field testing and prepare a written report describing test methods, and changes made during the testing, and summarizing test results. The service representative shall certify proper operation of the valve operator system upon successful completion of the final acceptance field testing.

4. Preliminary and final field tests shall be conducted at a time approved by the Engineer. The Engineer shall witness all field testing.

5. All costs in connection with field testing of equipment such as energy, light, lubricants, water, instruments, labor, equipment, temporary facilities for test purposes, etc. shall be borne by the Contractor. The Contractor shall be fully responsible for the proper operation of equipment during tests and instruction periods and shall neither have nor make any claim for damage which may occur to equipment prior to the time when the Owner formally takes over the operation thereof.

6. Preliminary field tests shall be conducted prior to start-up and shall include a functional check of the entire valve operator system and all system components. Preliminary field tests shall demonstrate that the valve operator system performs according to specifications and that all equipment, valves, controls, alarms, interlocks, etc., function properly. The preliminary field test report must be approved by the Engineer prior to conducting final field acceptance tests. Based on results of preliminary field tests, the Contractor shall make any adjustments required to settings, etc., to achieve the required valve closing time and operation specified or otherwise directed by the Engineer.

7. Final field acceptance tests shall be conducted simultaneously with the start-up and field testing of the process air blowers, etc. Field tests shall be conducted for the full range of operating modes and conditions specified and as directed by the Engineer. Each of the valves shall be tested at minimum, maximum, and normal head/flow conditions, and under all specified conditions of opening and closing.

8. Field testing shall include optimization of opening and closing times of the valves. The Contractor shall provide the means for accurate measurement of pipeline pressures as directed by the Engineer.

9. Field Testing: All valves shall be pressure tested at the pipeline test pressures specified in the piping sections. Any leakage or “sweating” of joints shall be stopped, and all joints shall be tight. All valves shall be operated at the pressures specified in the piping schedules for the connected pipe. Valves shall be tested for bi-directional shut-off where required by conditions of service.

B. The Owner may, at its discretion, visit and inspect the manufacturer's facilities. During the inspection visit, a witnessed shop test shall be performed for all standard tests listed in applicable standards.

C. The Contractor shall obtain and submit certified statements that the valves and hydrants comply with the requirements of the standards specified herein.

3.04 PAINTING AND COATINGS

A. Valves shall be shop primed for exposed piping service in accordance with Division 9, Painting.

- END OF SECTION -

SECTION 15100

VALVE OPERATORS

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Valve operators and electric valve actuators shall be designed to unseat, open or close, and seat the valve under the most adverse operating condition to which the valves will be subjected.

B. Operator mounting arrangements shall be as indicated on the Drawings or as directed by the manufacturer and/or Engineer. There shall be no mounting restrictions on the electric valve actuator.

C. The valve operators and electric actuators shall be the full and undivided responsibility of the valve manufacturer in order to ensure complete coordination of the components and to provide unit responsibility.

1.02 SUBMITTALS

A. The following items shall be submitted with the Shop Drawings in accordance with, or in addition to the submittal requirements specified in Section 01300 - Submittals;

1. Certification that the force required to operate all valves is as specified herein.

1.03 WARRANTY AND GUARANTEE

A. Warranty and Guarantee shall be concurrent with the valve that the operator is installed with.

PART 2 -- PRODUCTS

2.01 GENERAL

A. Manual operators shall be provided on all valves which do not receive electric actuators. Manual operator type shall be as specified herein and as shown on the Drawings.

B. Operators/actuators shall be furnished with conservatively sized extension bonnets, extension stems, or torque tubes, and all required appurtenances required for a complete installation. Operators furnished with extension bonnets shall include stainless steel extension stems, or stainless steel torque tubes.

C. Valves shall be furnished with operators, provided by the valve manufacturer. All operators of a given type shall be furnished by the same manufacturer. All valve operators, regardless of type, shall be installed, adjusted, and tested by the valve manufacturer at the manufacturing plant. Operator orientation shall be verified with the

Engineer prior to installation. If this requirement is not met, changes to orientation shall be made at no additional cost.

D. The Contractor, through the valve manufacturer, shall be solely responsible for the selection of the proper operator to meet the operating conditions specified herein. Field calibration and testing of the operators and valves to ensure a proper installation and an operating system shall be the responsibility of the Contractor.

E. All valve operators shall be provided with the valve by the valve manufacturer.

2.02 MANUAL OPERATORS

A. Unless otherwise specified or shown on the Drawings, manual operator type shall be as follows:

1. Buried valves shall be equipped with nut operators, extended stems, and valve boxes.

2. Exposed valves up to 6-inch shall be lever operated.

B. Manual operators shall be rigidly attached to the valve body unless otherwise specified or shown on the Drawings.

C. All operators shall turn counter-clockwise to open and shall have the open direction clearly and permanently marked.

D. Valve operators shall be designed so that the force required to operate the handwheel, lever, or chain (including breakaway torque requirements) does not exceed 80 pounds applied at the extremity of handwheel or chainwheel operator. Design pressures for sizing of valve operators shall be the piping test pressure for the piping in which the valve is to be installed as listed in Section 15000.

E. Handwheels for valves operators shall not be less than 12 inches in diameter. The maximum diameter of any handwheel shall not exceed 24 inches.

F. Geared manual operators shall be of the worm gear, traveling nut or scotch yolk type unless otherwise indicated in the individual valve specification. Gear operators shall be of the worm gear or bevel gear type. Gear box designs incorporating end of travel stops in the housing shall be equipped with AWWA input stops. Each gearbox shall require a minimum of 10 turns for 90 degree rotation or full valve stem travel and shall be equipped with a mechanical valve position indicator.

G. Manual operators on below grade (and vault installed) valves shall be permanently lubricated and watertight under an external water pressure of 10 psi.

H. All manual operators shall have levers or handwheels, unless otherwise shown. Where buried, the valves shall have extensions with square nuts or floor stands. Unless otherwise shown or specified, valves of sizes 4 inches and larger shall have gear-assisted operators.

PART 3 -- EXECUTION

3.01 MANUFACTURER'S FIELD SERVICES

A. The services of a qualified manufacturer's technical representative shall be provided in accordance with Section 15095 – Valves, General.

3.02 INSTALLATION

A. All valve actuators shall be installed in accordance with the manufacturer's published recommendations and the applicable specification sections for valves, and motor controls.

B. Valve actuators shall be factory coated in accordance with the manufacturer's standard paint system.

3.03 TESTING

A. Conduct a complete functional check of each unit. Correct any deficiencies found in shop testing prior to shipment.

B. Valve actuators shall be field-tested together with the associated valves.

1. Test all valves at the operating pressures at which the particular line will be used.

C. Preliminary Field Tests

1. General: Preliminary field tests shall be conducted prior to start-up and shall include a functional check of the entire valve operator system and all system components.

2. Scope: Preliminary field tests shall demonstrate that the valve operator system performs according to specifications and that all equipment and valves function properly.

3. Based on results of preliminary field tests, the Contractor shall make any adjustments required to settings, etc., to achieve the required valve closing time and operation, as specified or otherwise directed.

D. Final Field Tests

1. Final field tests shall be conducted in accordance with the latest revision of AWWA C500.

2. Final field tests shall be conducted simultaneously with the start-up and field testing of the pumps.

3. Final field tests shall be conducted as directed by the Engineer. Each of the valves shall be tested at minimum, maximum, and normal head/flow conditions, and under all specified conditions of opening and closing.

- END OF SECTION –

SECTION 15101

BUTTERFLY VALVES

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Reference Section 15000, Basic Mechanical Requirements.

PART 2 -- PRODUCTS

2.01 BUTTERFLY VALVES (PROCESS AIR)

A. Isolation valves and throttling valves for low pressure air service shall be 304 stainless steel, rubber seated, conforming to AWWA C504, 25 psi working pressure, with ANSI B16.1 flanges, 125 pound rating. Valves shall otherwise be as described under Butterfly Valves (General), except that all valve elements including seat shall be capable of withstanding continuous operation at 300°F.

2.02 BUTTERFLY VALVES (GENERAL)

A. Butterfly valves shall be of the rubber-seated, tight-closing type conforming to the latest revision of AWWA C504 Specifications. The manufacturer shall have a minimum of 5 years experience in manufacturing butterfly valves of the sizes required in accordance with AWWA C504 Specifications. All butterfly valves shall be the product of one manufacturer. Butterfly valves shall be as manufactured by DeZurik, Pratt, or Mueller. Each valve shall be performance and leak tested as specified in AWWA C504 revised as follows: In addition to the testing requirements of AWWA C504, each butterfly valve shall be thoroughly cleaned and opened and closed at least three (3) times prior to testing. Certified copies of the test results shall be submitted to the Engineer for approval prior to shipment of the valve.

B. Valves shall be certified to NSF/ANSI 61 – Drinking Water System Components – Health Effects and certified to be Lead-Free in accordance with NSF/ANSI 61, Annex G.

C. Butterfly valves shall be Class 150B, unless otherwise indicated in the valve schedules, and of the short body design with mechanical joint or flanged ends, as shown on the Drawings.

D. Valve bodies shall be epoxy coated cast iron conforming to ASTM A-126, Grade B, ASTM A-48, Class 40 or Ductile Iron ASTM A536, Grade 65-45-12. Where required to meet design operating conditions, valve bodies shall be manufactured of higher strength materials. Valve bodies shall have integral hubs for housing shaft bearings and seals.

E. Butterfly valves shall be of the concentric or eccentric shaft types. Valve discs shall be constructed of epoxy coated ductile iron, ASTM A536, Grade 65-45-12. Disks shall be of

the "offset" design to provide a full 360 degree seating surface with no external ribs transverse to flow, and shall comply with the latest revision of AWWA C504 Specifications. The valve manufacturer shall furnish Shop Drawings which include end clearance dimensions when the disc is in the full open position.

F. The resilient valve seat shall be synthetic rubber designed to seat against a pressure differential of 150 psi on either side of the valve, unless otherwise indicated. The resilient seat shall be mechanically attached to the valve disc or valve body. Any required seat attachment hardware shall be stainless steel. The resilient seat shall be capable of being adjusted or replaced in the field without moving the valve disc along the shaft axis, or removing the valve from the line. The mating seat surface shall be stainless steel or monel.

   1. The seats shall be factory tested as per AWWA C504 at a test pressure of 150 psig, unless otherwise indicated, and post adjusted for differential pressures indicated herein.

G. Valve shafts shall be one-piece or two-piece units of stainless steel construction suitably sized to transmit the torques required to operate the valves under the conditions listed in the valve schedule with appropriate safety factor. Shafts shall be securely attached to valve disc by means of conservatively sized corrosion-resistant taper pins, threaded at one end and secured with lockwashers and nuts (i.e.: mechanically attached). Provide O-ring seal on taper pin if required to prevent leakage. Shaft key shall be constructed of corrosion-resistant material.

H. Shaft bearings shall be contained in the integral hubs of the valve body and shall be the permanently self-lubricated, corrosion resistant, sleeve type of Teflon or heavy-duty bronze. The valve assembly shall be furnished with a factory set two-way thrust bearing designed to center the valve disc in the valve seat at all times. End cover bolts shall be of stainless steel construction.

I. The shaft seal shall be either the bronze cartridge type with at least two O-rings, monolithic V-Type, or pull down packing type. If monolithic V-Type or pull down packings are utilized, it shall be self-adjusting, self-compensating type. Packing shall be as manufactured by Chevron, or equal. Butterfly valves with pull down packings shall be designed with an extension bonnet so that repacking can be done without removal of the actuator. For buried valves with pull down packing the packing gland cover assembly shall be heavy duty, soil and water resistant. Stuffing boxes for pull down packing shall have a depth sufficient to accept at least four rings of self-compensating type packing specifically selected for the operating pressures to be encountered. Stuffing box bolts, studs and nuts shall be stainless steel.

J. The "O" ring type shaft seal shall be contained in a removable bronze cartridge. The bronze cartridge shall be manufactured from ASTM B505 copper alloy UNS #C93200 and shall meet the requirements of AWWA C504 for bronze, Grade E. The "O" ring material shall be nitrile, BUNA-N rubber, as intended for use with potable water or wastewater and per ASTM D-2000 with a hardness of 70 Shore A Durometer.

K. The manufacturer shall certify that the butterfly valves are capable of operating in continuous duty service under these pressures and flow conditions.

L. Each valve shall by hydrostatically tested and tested for bubble tightness after the operator has been mounted and adjusted. Copies of the hydrostatic and leakage test certification and certification of conformance shall be submitted to the Engineer prior to shipment.

M. All internal and external ferrous components and surfaces of the valves, with the exception of stainless steel and finished or bearing surfaces, shall be shop painted with two coats (10 mils min. dry film thickness) of the manufacturer's premium epoxy for corrosion resistance. Damaged surfaces shall be repaired in accordance with the manufacturer's recommendations.

- END OF SECTION -

SECTION 15995

PIPELINE TESTING

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Perform flushing and testing of all pipelines and appurtenant piping, complete, including conveyance of test water from Owner-designated source to point of use and all disposal thereof, all in accordance with the requirements of the Contract Documents.

1.02 SUBMITTALS

A. Submit, in writing, a testing schedule for approval a minimum of seven (7) days before testing is to start.

PART 2 -- PRODUCTS

2.01 MATERIALS REQUIREMENTS

A. Determine and furnish all test equipment, temporary valves or bulkheads, temporary vents or drains or other water control equipment and materials, subject to the Engineer's review. No materials shall be used which would be injurious to the construction or its future function.

PART 3 -- EXECUTION

3.01 GENERAL

A. Unless otherwise provided herein, water for testing pipelines will be furnished by the Owner; however, the Contractor shall make all necessary provisions for conveying the water from the Owner-designated source to the points of use.

B. Test all pressure pipelines. Perform all testing operations in the presence of the Engineer.

3.02 PRESSURE TESTING OF PROCESS AIR PIPING

A. All piping shall be properly flushed and tested unless specifically exempted elsewhere in the Specifications or otherwise approved by the Engineer. Air and gas pipelines shall be flushed and tested with compressed air. Air and gas piping shall be completely and thoroughly cleaned of all foreign matter, scale, and dirt prior to start-up of the air or gas system.

B. Compressed/service air and gas piping shall be flushed by removing end caps from the distribution lines and operating one (1) compressor, in accordance with the manufacturer's instructions.

C. After flushing, all air piping shall be pressure and leak tested prior to coating and wrapping of welded joints. Immediately upon successful completion of the pressure and leak test,

welded joints shall be thoroughly cleaned of all foreign matter, scale, rust, and discoloration and coated in accordance with the Specifications.

D. All process air piping shall be leak tested by applying a soap solution to each joint. Leak tests shall be conducted with one (1) blower in service at normal operating pressure.

E. During testing the piping shall show no leakage. Any leaks or defective piping disclosed by the leakage test shall be repaired or replaced by the Contractor, at his own expense, and the test repeated until all such piping shows tight.

F. All buried process air piping shall be pressurized to 10 psig and tested for leaks by applying a soap solution to each joint. The air supply shall be stopped and the pipe pressure monitored. System pressure shall not fall by more than 0.5% of the 10 psig test pressure over a one-hour test period. Should the system fail to hold the required pressure for one hour, the cause shall be determined and corrected and the test repeated until a successful test of the entire system is obtained.

G. Field leakage tests shall be performed for all submerged process air piping. The procedure shall consist of operating the system under clear nonpotable water for visual identification of all leaks. All field leakage tests shall be witnessed by the Engineer. All submerged piping shall be installed free of any leaks.

- END OF SECTION -

SECTION 16000

BASIC ELECTRICAL REQUIREMENTS

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish all labor, materials, tools, and equipment, and perform all work and services necessary for, or incidental, to the furnishing and installation of all electrical work as shown on the Drawings, and as specified in accordance with the provisions of the Contract Documents and completely coordinate with the work of other trades involved in the general construction. Although such work is not specifically shown or specified, all supplementary or miscellaneous items, appurtenances, and devices incidental to or necessary for a sound, secure, and complete installation shall be furnished and installed as part of this work. The Contractor shall obtain approved Shop Drawings showing wiring diagrams, connection diagrams, roughing-in and hook up details for all equipment and comply therewith. All electrical work shall be complete and left in operating condition in accordance with the intent of the Drawings and the Specifications for the electrical work.

B. Where the word "Contractor" appears in these Technical Specifications it shall be construed to mean the Electrical Contractor.

C. The Contractor shall reference the functional descriptions and other requirements found in Division 17, Instruments and Control Programming Requirements, for additional requirements pertaining to work under this contract. The functional descriptions referenced herein shall be considered as part of the work required under this contract.

D. The Contractor shall be responsible for all interconnecting devices, conduit, wire, and appurtenances not furnished by others but required for the operation of equipment as described in the functional descriptions whether specifically shown on the drawings or not.

E. The scope of work for this project primarily includes, but is not limited to, the following:

1. Install replacement blower control panel supplied under Division 11, connect existing panel power leads to new panel.

2. Furnish and install new conduit and power cable from replacement blower control panel to each blower.

3. Furnish and install new conduit and signal cables from replacement blower control panel to control devices on each blower.

4. Furnish and install new fiber optic cable from replacement blower control panel to existing PLC-1 in the operations building.

5. Provide temporary electrical power for all construction needs including temporary blower equipment supplied by the General Contractor.

F. Maintaining the operation of these facilities during the duration of the construction period is essential and required. The Contractor shall furnish and install temporary equipment as required to maintain facility operation. Reference Section 01520 of the Specifications for construction sequencing and specific operational constraint information.

G. All electrical equipment shall conform to the applicable NEMA specifications. All electrical equipment shall be properly identified in accordance with these Specifications and Contract Drawings. All new electrical equipment and boxes shall be labeled using engraved, laminated acrylic or melamine label, punched or drilled for mounting with Type 316 stainless steel screws. Letter and background color shall match existing labels used at the facility with minimum letter height of 3/8 inch.

H. All materials, equipment, sizes and capacities of electrical equipment incorporated in the project shall conform to the latest requirements of the current National Electric Code, the National Electrical Manufacturer's Association, the State and local electrical codes, to other local authorities having jurisdiction (AHJs), and to applicable rules and regulations of the local electrical utility serving the project.

I. All material and equipment must be the product of an established and reputable manufacturer; must be new and of first class construction; must be designed and guaranteed to perform the service required; and must bear the label of approval of the Underwriters Laboratories, Inc., or other nationally recognized testing laboratory that is accepted by the NEC where such approval is available for the product of the listed manufacturer as approved by the Engineer.

J. When a specified or indicated item has been superseded or is no longer available, the manufacturer's latest equivalent type or model of material or equipment as approved by the Engineer shall be furnished and installed at no additional cost to the Owner.

K. Where the Contractor's selection of equipment of specified manufacturers or additionally approved manufacturers requires changes or additions to the system design, the Contractor shall be responsible in all respects for the modifications to all system designs, subject to approval of the Engineer. The Contractor's bid shall include all costs for all work of the Contract for all trades made necessary by such changes, additions or modifications or resulting from any approved substitution.

L. Furnish and install all stands, racks, brackets, supports, and similar equipment required to properly serve the equipment which is furnished under this Contract, or equipment otherwise specified or indicated on the Drawings.

1.02 DRAWINGS

A. The Contractor shall furnish, install, and place in satisfactory condition ready for operation, all conduits, cables, and all other material needed for the complete lighting, power, control and other electrical systems shown or indicated in the Contract Drawings. Additional conduits and the required wiring shall be installed by the Contractor wherever needed to complete the installation of the specific equipment furnished.

1.03 EQUIPMENT LOCATION

A. The Drawings show the general location of feeders, transformers, outlets, conduits, and circuit arrangements. Because of the small scale of the Drawings, it is not possible to indicate all of the details involved. The Contractor shall carefully investigate the structural and finish conditions affecting all of his work and shall arrange such work accordingly; furnishing such fittings, junction boxes, and accessories as may be required to meet such conditions. The Contractor shall refer to the entire Drawing set to verify openings, special surfaces, and location of other equipment, or other special equipment prior to roughing-in for panels, switches, and other outlets. The Contractor shall verify all equipment dimensions to insure that proposed equipment will fit properly in spaces indicated.

1.04 LOCAL CONDITIONS

A. The Contractor shall examine the site and become familiar with conditions affecting the work. The Contractor shall investigate, determine, and verify locations of any overhead or buried utilities on or near the site, and shall determine such locations in conjunction with all public and/or private utility companies and with all authorities having jurisdiction.

B. In addition, the Contractor shall relocate all duct banks, lighting fixtures, receptacles, switches, boxes, and other electrical equipment as necessary to facilitate the Work included in this project at no additional cost to the Owner.

1.05 SUBMITTALS

A. In accordance with the procedures and requirements set forth in the General Conditions, Section 01300, Submittals and the requirements of the individual specification sections, the Contractor shall obtain from the equipment manufacturer and submit the following:

1. Shop Drawings

2. Operation and Maintenance Manuals

3. Spare Parts List

4. Special Tools List

5. Proposed Testing Methods and Reports of Certified Shop Tests.

6. Reports of Certified Field Tests.

7. Manufacturer's Representative's Certification.

B. Submittals shall be sufficiently complete in detail to enable the Engineer to determine compliance with Contract requirements.

C. Submittals will be approved only to the extent of the information shown. Approval of an item of equipment shall not be construed to mean approval for components of that item for which the Contractor has provided no information.

1.06 APPLICABLE CODES AND REQUIREMENTS

A. Conformance

1. All work, equipment and materials furnished shall conform with the existing rules, requirements and specifications of the Insurance Rating Organization having jurisdiction, the serving electrical utility company, the latest edition of the National Electrical Code (NEC), the National Electric Manufacturers Association (NEMA), the Institute of Electrical and Electronic Engineers (IEEE), the Insulated Cable Engineers Association (ICEA), the American Society of Testing Materials (ASTM), the American National Standards Institute (ANSI), the requirements of the Occupational Safety Hazards Act (OSHA), and all other applicable Federal, State and local laws and/or ordinances.

2. All material and equipment shall bear the inspection labels of Underwriters Laboratories, Inc., if the material and equipment is of the class inspected by said laboratories.

3. All work shall be in accordance with local codes.

B. Nonconformance: Any paragraph of requirements in these Specifications, or Drawings, deviating from the rules, requirements and Specifications of the above organizations shall be invalid and their (the above organizations) requirements shall hold precedent thereto. The Contractor shall be held responsible for adherence to all rules, requirements and specifications as set forth above. Any additional work or material necessary for adherence will not be allowed as an extra, but shall be included in the Bid. Ignorance of any rule, requirement, or Specification shall not be allowed as an excuse for nonconformity. Acceptance by the Engineer does not relieve the Contractor from the expense involved for the correction of any errors which may exist in the drawings submitted or in the satisfactory operation of any equipment.

C. Certification: Upon completion of the work, the Contractor shall obtain certificate(s) of inspection and approval from inspection organizations having jurisdiction and shall deliver same to the Engineer and the Owner.

1.07 PERMITS AND INSPECTIONS

A. Reference the General Conditions and Section 01010, Summary of Work.

1.08 TEMPORARY LIGHTING AND POWER

A. Reference the General Conditions and Section 01510, Temporary Utilities.

1.09 TESTS

A. Upon completion of the installation, the Contractor shall perform tests for operation, load (Phase) balance overloads, and short circuits. Tests shall be made with and to the satisfaction of the Owner and Engineer.

B. The Contractor shall perform all field tests and shall provide all labor, equipment, and incidentals required for testing and shall pay for electric power required for the tests. All defective material and workmanship disclosed shall be corrected by the Contractor at no

cost to the Owner. The Contractor shall show by demonstration in service that all circuits and devices are in good operating condition. Test shall be such that each item of control equipment will function not less than five (5) times.

C. Grounding systems shall be tested to assure continuity and compliance with the contract requirements.

D. Insulation resistance testing of all incoming and outgoing cables for switchgear, motor control centers, lighting and power distribution panelboards, and similar equipment shall be done after the cables are in place and just prior to final terminations. All data shall be recorded, as per Exhibit "A", attached to the end of this Section.

E. Feeder circuits shall be tested with the feeder conductors disconnected from the supplied equipment. Each individual power circuit shall be tested at the panel or motor control center with the power equipment connected for proper operation.

F. The equipment to be tested shall include, but not be limited to, the following:
- Low Voltage Molded Case Circuit Breakers
- Conduit System
- Cable and Wire
- Grounding System

G. Refer to each specific specification section for detailed field tests.

H. The Contractor shall complete the installation and testing of the electrical installation at least two (2) weeks prior to the start-up and testing of all other equipment. During the period between the completion of electrical installation and the start-up and testing of all other equipment, the Contractor shall make all components of the Work available as it is completed for their use in performing Preliminary and Final Field Tests.

I. Before each test commences, the Contractor shall submit a detailed test procedure, and also provide test engineer resume, manpower and scheduling information for the approval by the Engineer. In addition, the Contractor shall furnish detailed test procedures for any of his equipment required as part of the field tests of other systems.

J. Just prior to the final acceptance of a piece of equipment, the Contractor shall perform an infrared inspection to locate and correct all heating problems associated with that electrical equipment. The infrared inspection shall include both digital and IR pictures which shall be submitted to the Owner for record purposes. The infrared inspection shall be performed by a third party, independent testing agency, not the Electrical Contractor.

The infrared inspection shall apply to all new equipment and existing equipment that is in any way modified under this Contract. All heating problems detected with new equipment furnished and installed under the Scope of this Contract shall be corrected by the Contractor. All problems detected with portions of existing equipment modified under this Contract shall also be corrected by the Contractor.

Any problems detected with portions of existing equipment that were not modified under this Contract are not the responsibility of the Contractor. Despite the Contractor not being held responsible for these problems, the Contractor shall report them to the Owner and Engineer immediately for resolution.

1.10 DOCUMENTATION

A. The work requirements of this Section are in addition to and do not supersede testing and adjusting specified in other portions of the Contract Documents. The Contractor shall submit to the Engineer test records and reports for all testing.

1.11 PROTECTIVE DEVICE SETTING AND TESTING

A. Provide the services of a qualified, N.E.T.A. certified technician to adjust, set, calibrate and test all new protective devices in the electrical system.

B. All new protective devices in the electrical equipment shall be set, adjusted, calibrated and tested in accordance with the manufacturers' recommendations, any existing facility coordination study applicable to this work, and best industry practice.

C. Proper operation of all equipment associated with the device under test and its compartment shall be verified, as well as complete resistance, continuity and polarity tests of power, protective and metering circuits. Any minor adjustments, repairs and/or lubrication necessary to achieve proper operation shall be considered part of this Contract.

D. All solid state trip devices shall be checked and tested for setting and operation using manufacturers recommended test devices and procedures.

E. Circuit breakers and/or contactors associated with the above devices shall be tested for trip and close functions with their protective device.

F. When completed, provide a report for all equipment tested indicating condition, readings, settings, faults and/or deficiencies noted. Inoperative or defective equipment shall be brought immediately to the attention of the Engineer.

G. Prior to placing any equipment in service, correct operation of all protective devices associated with this equipment shall be demonstrated by field testing under simulated load conditions.

1.12 SCHEDULES AND PLANT OPERATIONS

A. If testing or connection of electrical equipment requires any existing process equipment be taken out of service, all testing procedures and schedules must be submitted to the Engineer for review and approval one (1) month prior to any work beginning. When testing has been scheduled, the Engineer must be notified 48 hours prior to any work to allow time for load switching and/or alternation of equipment. In addition, all testing that requires temporary shutdown of plant equipment must be coordinated with the Owner/Engineer so as not to affect proper plant operations.

B. At the end of the workday, all existing equipment shall be back in place and ready for immediate use should a plant emergency arise. In addition, should an emergency condition occur during testing, at the request of the Owner, the equipment shall be placed back in service immediately and turned over to plant personnel.

C. In the event of accidental shutdown of plant equipment, the Contractor shall notify plant personnel immediately to allow for an orderly restart of affected equipment.

1.13 MATERIALS HANDLING

A. Materials arriving on the job site shall be stored in such a manner as to keep material free of rust and dirt and so as to keep material properly aligned and true to shape. Rusty, dirty, or misaligned material shall be rejected. Electrical conduit shall be stored to provide protection from the weather and accidental damage. Rigid non-metallic conduit shall be stored on even supports and in locations not subject to direct sun rays or excessive heat. Cables shall be sealed, stored, and handled carefully to avoid damage to the outer covering or insulation and damage from moisture and weather. Adequate protection shall be required at all times for electrical equipment and accessories until installed and accepted. Materials damaged during shipment, storage, installation, or testing shall be replaced or repaired in a manner meeting with the approval of the Engineer.

(Continued on Next Page)

(EXHIBIT A) TEST DATA - MEGOHMS TEST NO. ____							
Date:			Company:				
Time:			Location:				
Circuit:	Circuit Length:	Aerial:	Duct:	Buried:	No. of Conductors	Size:	AMG MCM Shld:
Insulation Material:			Insulation Thickness:		Voltage Rating:		Age:
Type: _____Pothead _____Terminal					Location: Indoors_____ Outdoors_____		
Number and Type of Joints:							
Recent Operating History:							
Manufacturer:							
State if Potheads or Terminals were grounded during test:							
List associated equipment included in test:							
Miscellaneous Information:							

(EXHIBIT A)
TEST DATA - MEGOHMS
TEST NO. ____

Part Tested: Test Made:_____
Hours/Days:_____
After Shutdown:_____

Grounding Time: Dry Bulb Temperature:_____
Wet Bulb Temperature:_____

Test Voltage:

Equipment Temperature: _____
How Obtained: _____
Relative Humidity: _____
Absolute Humidity: _____
Dew Point: _____

Megohmmeter: Serial Number: _____ Range: _____
Voltage: _____ Calibration Date_____

Test Connections	To Line To Earth To Ground	To Line To Earth To Ground	To Line To Earth To Ground	Test Connections	To Line To Earth To Ground	To Line To Earth To Ground	To Line To Earth To Ground
□ Minute				5 Minutes			
□ Minute				6 Minutes			
3/4 Minute				7 Minutes			
1 Minute				8 Minutes			
2 Minutes				9 Minutes			
3 Minutes				10 Minutes			
4 Minutes				10/1 Minutes			
				Ratio			

Remarks:

PART 2 -- PRODUCTS

2.01 PRODUCT REQUIREMENTS

A. Unless otherwise indicated, the materials to be provided under this Specification shall be the products of manufacturers regularly engaged in the production of all such items and shall be the manufacturer's latest design. The products shall conform to the applicable standards of UL and NEMA, unless specified otherwise. International Electrotechnical Commission (IEC) standards are not recognized. Equipment designed, manufactured, and labeled in compliance with IEC standards is not acceptable.

B. All items of the same type or ratings shall be identical. This shall be further understood to include products with the accessories indicated.

C. All equipment and materials shall be new, unless indicated or specified otherwise.

D. The Contractor shall submit proof if requested by the Engineer that the materials, appliances, equipment, or devices that are provided under this Contract meet the requirements of Underwriters Laboratories, Inc., in regard to fire and casualty hazards. The label of or listing by the Underwriters Laboratories, Inc., will be accepted as conforming with this requirement.

2.02 SUBSTITUTIONS

A. Any reference in the Specifications or on the Drawings to any article, service, product, material, fixture, or item of equipment by name, make, or catalog number shall be interpreted as establishing the type, function, and standard of quality and shall not be construed as limiting competition.

2.03 CONCRETE

A. The Contractor shall furnish all concrete required for the installation of all electrical work, Concrete shall be Class A unless otherwise specified. Concrete and reinforcing steel shall meet the appropriate requirements of Division 3 of the Specifications.

B. The Contractor shall provide concrete equipment pads for all free standing electrical apparatus and equipment located on floors or slabs that exist or provided by others. The Contractor shall provide all necessary anchor bolts, channel iron sills, and other materials as required. The exact location and dimensions shall be coordinated for each piece of equipment well in advance of the scheduled placing of these pads. Equipment pads shall be 4 inches high unless otherwise indicated on the Drawings and shall conform to standard detail for equipment pads shown on the Contract Drawings. Equipment pads shall not have more than 3” excess concrete beyond the edges of the equipment.

C. The Contractor shall provide concrete foundations for all free standing electrical apparatus and equipment located outdoors or where floors or slabs do not exist or provided by others. The Contractor shall provide all necessary anchor bolts, channel iron sills, and other materials as required. The location and dimensions shall be coordinated for each piece of equipment well in advance of the scheduled placing of the foundations. Equipment foundations shall be constructed as detailed on the Drawings or if not detailed on the Drawings shall be 6 inches thick minimum reinforced with #4 bars at 12-inch centers each

way placed mid-depth. Concrete shall extend 6 inches minimum beyond the extreme of the equipment base and be placed on a compacted stone bed (#57 stone or ABC) 6 inches thick minimum.

PART 3 -- EXECUTION

3.01 CUTTING AND PATCHING

A. Coordination: The Work shall be coordinated between all trades to avoid delays and unnecessary cutting, channeling and drilling. Sleeves shall be placed in concrete for passage of conduit wherever possible.

B. Damage: The Contractor shall perform all chasing, channeling, drilling and patching necessary to the proper execution of his Contract. Any damage to the building, structure, or any equipment shall be repaired by qualified mechanics of the trades involved at the Contractor's expense. If, in the Engineer's judgment, the repair of damaged equipment would not be satisfactory, then the Contractor shall replace damaged equipment at his own expense.

C. Existing Equipment: Provide a suitable cover or plug for openings created in existing equipment as the result of work under this Contract. For example, provide round plugs in equipment enclosures where the removal of a conduit creates a hole and the enclosure. Covers and plugs shall maintain the NEMA rating of the equipment enclosure. Covers and plugs shall be watertight when installed in equipment located outdoors.

3.02 EXCAVATION AND BACKFILLING

A. The Contractor shall perform all excavation and backfill required for the installation of all electrical work. All excavation and backfilling shall be in complete accordance with the applicable requirements of Division 2.

3.03 CORROSION PROTECTION

A. Wherever dissimilar metals, except conduit and conduit fittings, come into contact, the Contractor shall isolate these metals as required with neoprene washers, nine (9) mil polyethylene tape, or gaskets.

- END OF SECTION -

SECTION 16010

ELECTRICAL GENERAL PROVISIONS AND SPECIAL PROVISIONS

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Subcontract to a qualified electrical subcontractor to perform the electrical work, complete and operable, in accordance with the Contract Documents.

B. The provisions of this Section apply to all sections in Division 16, except as indicated otherwise.

C. The Work of this Section is required for operation of electrically-driven equipment provided under specifications in other Divisions. The Electrical Subcontractor's attention is directed to the requirement for proper coordination of the Work of this Section with the Work of equipment specifications, the Work of instrumentation sections, and the Work of mechanical systems.

D. Concrete, excavation, backfill, and steel reinforcement required for encasement, installation, or construction of the Work of the various sections of Division 16 is included as a part of the Work under the respective sections, including duct banks, manholes, hand-holes, transformer pads, cooling radiator pads, equipment housekeeping pads, and light pole bases.

E. Electrical Subcontractor shall maintain a qualified supervisor on site throughout the entire construction phase of the work.

1.02 INTENT OF DRAWINGS

A. Electrical plan drawings show only general location of equipment, devices, and raceway, unless specifically dimensioned. The Electrical Subcontractor shall be responsible for the proper routing of raceway, subject to the approval of the Engineer.

B. All electrical equipment sizes and characteristics are based on manufacturers named in these specifications and as listed on the Drawings. If the Electrical Subcontractor chooses, and is allowed, to substitute, the Electrical Subcontractor shall be responsible for fitting all the equipment in the available space as shown on the Drawings.

1.03 SCOPE OF ELECTRICAL WORK

A. Furnish and install the complete electrical power distribution system as shown on the drawings. Scope of work shall be as stated in Section 16000 and include connection of new power feeds to spare breakers in existing motor control centers for permanent and temporary motors as well as new power and control system wiring and conduit.

B. Provide and install all electrical wiring and equipment required to support power, instrumentation and control systems as shown on the drawings, complete in place.

C. Properly ground new control panel to existing ground system.

D. Provide all miscellaneous/ancillary electrical equipment including fittings, cable terminations, wiring, conduit, junction boxes, pull boxes, strain relief fittings, bushings, etc. whether not specified but obviously required for a complete operational electrical and control system.

E. Provide and install any temporary construction power required to complete the work.

1.04 REFERENCE STANDARDS

A. The Work of this Section and all sections in Division 16 shall comply with the following as applicable:

NEC (NFPA 70)	National Electrical Code
NETA	International Electrical Testing Association
NEMA	National Electrical Manufacturers Association
UL	Underwriters' Laboratories
OSHA	Occupational Safety and Health Act
ASTM	American Society for Testing and Materials
FBC	Florida Building Code
ANSI	American National Standards Institute
IEEE	Institute of Electrical and Electronic Engineers
State Fire Marshal	
State and Federal Laws	
Local Laws and Ordinances	

B. Electrical equipment shall be listed by and shall bear the label of Underwriters' Laboratories, Inc. (UL) or an independent testing laboratory acceptable to the local code enforcement agency having jurisdiction.

C. Install all electrical equipment and materials in compliance with OSHA Safety and Health Standards (29 CFR 1910 and 29 CFR 1926, as applicable), state building standards, and applicable local codes and regulations.

D. Where the requirements of the specifications conflict with UL, NEMA, NFPA, or other applicable standards, the more stringent requirements shall govern.

1.05 SIGNAGE

A. Updated MCC bucket signage: Legibly mark all modified or updated MCC bucket breaker sections for re-purposed service. Match signage used on existing MCC.

1.06 TEMPORARY/CONSTRUCTION POWER

A. Electrical Subcontractor shall furnish local construction and temporary power as required for all disciplines and as directed by the Contractor.

1.07 PERMITS AND INSPECTION

A. Obtain permits and pay inspection fees in accordance with the General Conditions and Requirements.

1.08 SUBMITTALS

A. Furnish submittals in accordance with the General Requirements.

B. Shop Drawings include the following:

1. Complete material lists stating manufacturer and brand name of each item or class of material.

2. Shop Drawings for all grounding Work not specifically indicated.

3. Front, side, rear elevations, and top views with dimensional data.

4. Location of conduit entrances and access plates.

5. Component data.

6. Connection diagrams, terminal numbers, internal wiring diagrams, conductor size, and cable numbers.

7. Method of anchoring, seismic requirements, weight.

8. Types of materials and finish.

9. Nameplates.

10. Temperature limitations, as applicable.

11. Voltage requirement, phase, and current, as applicable.

12. Front and rear access requirements.

13. Test reports.

14. Grounding requirements.

15. Catalog cuts or photocopies of applicable pages of bulletins or brochures for mass produced, non-custom manufactured material. Catalog data sheets shall be stamped to indicate the project name, applicable Section and paragraph,

model number, and options. The specific equipment catalog/series number on each page shall be highlighted along with all accessories/options furnished.

16. Shop Drawings shall be custom prepared. Drawings or data indicating "optional" or "as required" equipment are not acceptable. Options not proposed shall be crossed out or deleted from Shop Drawings.

C. Owner's Manuals: Complete information in accordance with the General Requirements.

D. Record Drawings: Record drawings shall be prepared, be available to the Engineer, and be submitted according to the General Requirements.

1.09 AREA DESIGNATIONS

A. Environmental Conditions

1. Raceway system enclosures shall comply with Section 16110 - Electrical Raceway Systems.

2. Electric Work specifically indicated in sections within any of the Specifications shall comply with those requirements.

3. Exterior electrical work shall comply with and meet NEMA 4X classification. Indoor electrical work shall comply with and meet NEMA 1 classification.

B. Material Requirements

1. NEMA 4X enclosures shall be Type 316 stainless steel and shall have a white coated exterior to reduce internal temperatures when exposed to direct sunlight.

2. NEMA 1 enclosures shall be steel coated with ANSI 61 grey paint.

1.10 TESTS

A. The Electrical Subcontractor shall be responsible for factory and field tests required by specifications in Division 16 and by the Engineer or other authorities having jurisdiction. The Electrical Subcontractor shall furnish necessary testing equipment and pay costs of tests, including all replacement parts and labor, due to damage resulting from damaged equipment or from testing and correction of faulty installation.

B. Where test reports are indicated, proof of design test reports for mass-produced equipment shall be submitted with the Shop Drawings, and factory performance test reports for custom-manufactured equipment shall be submitted and be approved prior to shipment. Field test reports shall be submitted for review prior to Substantial Completion.

C. Equipment or material which fails a test shall be removed and replaced.

PART 2 -- PRODUCTS

2.01 GENERAL

A. Equipment and materials shall be new, shall be listed by UL, and shall bear the UL label where UL requirements apply. Equipment and materials shall be the products of experienced and reputable manufacturers in the industry. Similar items in the Work shall be products of the same manufacturer. Equipment and materials shall be of industrial grade standard of construction.

B. Where a NEMA enclosure type is indicated in a non-hazardous location, utilize that type of enclosure, despite the fact that certain modifications such as cutouts for control devices may negate the NEMA rating.

C. On devices indicated to display dates, the year shall be displayed as 4 digits.

2.02 MOUNTING HARDWARE

A. Miscellaneous Hardware

1. Nuts, bolts, and washers shall be Type 316 stainless steel.

2. Threaded rods for trapeze supports shall be continuous threaded, Type 316 stainless steel, 3/8-inch diameter minimum.

3. Strut for mounting of conduits and equipment in indoor and outdoor locations shall be 316 Stainless Steel. Where contact with concrete or dissimilar metals may cause galvanic corrosion, use suitable non-metallic insulators to prevent such corrosion. Strut shall be as manufactured by Unistrut, B-Line, or equal.

4. Anchors for attaching equipment to concrete walls, floors and ceilings shall be stainless steel expansion anchors, such as "Rawl-Bolt," "Rawl-Stud" or "Lok-Bolt" as manufactured by Rawl; similar by Star, or equal. Wood plugs shall not be permitted.

2.03 ELECTRICAL IDENTIFICATION

A. New Equipment Nameplates: As noted in Section 16000.

B. New Conductor Identification: Conductor and equipment identification devices shall be either imprinted plastic-coated cloth marking devices such as manufactured by Brady, Thomas & Betts, or equal, or shall be heat-shrink plastic tubing, imprinted split-sleeve markers cemented in place, or equal.

PART 3 -- EXECUTION

3.01 GENERAL

A. Incidentals: Provide all materials and incidentals required for a complete and operable system, even if not required explicitly by the Specifications or the Drawings. Typical incidentals are terminal lugs not furnished with vendor supplied equipment, compression connectors for cables, splices, junction and terminal boxes, and control wiring required by vendor furnished equipment to connect with other equipment indicated in the Contract Documents.

B. Field Control of Location and Arrangement: The Drawings diagrammatically indicate the desired location and arrangement of outlets, conduit runs, equipment, and other items. Exact locations shall be determined by the Electrical Subcontractor in the field based on the physical size and arrangement of equipment, finished elevations, and other obstructions. However, follow locations on the Drawings as closely as possible.

1. Where conduit development drawings or "home runs" are shown, route the conduits in accordance with the indicated installation requirements. Routings shall be exposed or encased as indicated, except that conduit in finished areas shall be exposed unless specifically indicated otherwise. Conduits encased in a slab shall be sized for conduit OD to not exceed one-third of the slab thickness and be laid out and spaced to not impede concrete flow.

2. Install conduit and equipment in such a manner as to avoid all obstructions and to preserve head room and keep openings and passageways clear. Locate lighting fixtures, switches, convenience outlets, and similar items within finished rooms as indicated. Where the Drawings do not indicate exact locations, such locations shall be determined by the Engineer. If equipment is installed without instruction and must be moved, it shall be moved without additional cost to the Owner.

3. Wherever conduits and wiring for lighting and receptacles are not indicated, it shall be the Electrical Subcontractor's responsibility to provide all lighting and receptacle-related conduits and wiring as required, based on the actual installed fixture layout and the circuit designations as indicated. Wiring shall be #10 AWG minimum, and conduits shall be 3/4-inch minimum (exposed) and 1-inch minimum (encased). Where circuits are combined in the same raceway, derate conductor ampacities in accordance with NEC requirements.

C. Workmanship: Install materials and equipment in strict accordance with printed recommendations of the manufacturer. Installation shall be accomplished by workers skilled in the work. Coordinate installation in the field with other trades to avoid interferences.

D. Protection of New and Existing Equipment and Materials: The Electrical Subcontractor shall fully protect materials and equipment against damage from any cause. Materials and equipment, both in storage and during construction, shall be covered in such a manner that no finished surfaces will be damaged, marred, or splattered with water, foam, plaster, or paint. Moving parts shall be kept clean and dry. Replace or refinish

damaged materials or equipment, including face plates of panels and switchboard sections as part of the Work.

3.02 CORE DRILLING

A. Perform core drilling required for installation of raceways through concrete walls and floors. Locations of floor penetrations, as may be required, shall be based on field conditions. Verify all exact core drilling locations based on equipment actually furnished as well as exact field placement. To the extent possible, identify the existence and locations of encased raceways and other piping in existing walls and floors with the Owner prior to any core drilling activities. Damage to any encased conduits, wiring, and piping shall be repaired as part of the Work.

3.03 EQUIPMENT ANCHORING

A. Anchor in place all floor supported, wall, or ceiling hung equipment and conductors by methods that will meet seismic requirements in the area where the project is located. Wall-mounted panels that weigh more than 500 pounds or which are within 18-inches of the floor shall be provided with fabricated steel support pedestals. If the supported equipment is a panel or cabinet enclosed within removable side plates, it shall match supported equipment in physical appearance and dimensions.

3.04 CLEANING

A. Before final acceptance, thoroughly clean the electrical Work. Exposed parts shall be thoroughly clean of cement, plaster, and other materials. Oil and grease spots shall be removed with a non-flammable cleaning solvent. Such surfaces shall be carefully wiped and all cracks and corners scraped out. Touch-up paint shall be applied to scratches on panels and cabinets. Electrical cabinets or enclosures shall be vacuum-cleaned.

- END OF SECTION -

SECTION 16110

ELECTRICAL RACEWAY SYSTEMS

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Electrical Subcontractor shall provide electrical raceway systems, complete and in place, in accordance with the Contract Documents.

1.02 SUBMITTALS

A. Furnish submittals in accordance with the General Requirements and 16010.

B. Shop Drawings: Complete catalog cuts of all raceways, fittings, boxes, supports, and mounting hardware, marked where applicable to show proposed materials and finishes.

1.03 REFERENCES

A. The following is a list of standards that may be referenced in this section:

B. American Association of State Highway and Transportation Officials (AASHTO): Division I, Standard Specifications for Highway Bridges, Fourteenth Edition.

C. American National Standards Institute (ANSI): CS0.5, Rigid Aluminum Conduit

D. American Society for Testing and Materials (ASTM): C857, Standard Practice for Minimum Structural Design Loading for Underground Pre-cast Concrete Utility Structures.

E. National Electrical Contractor's Association, Inc. (NECA): 5055, Standard of Installation.

F. National Electrical Manufacturers Association (NEMA):

1. TC 2, Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).

2. TC 3, PVC Fittings for Use with Rigid PVC Conduit and Tubing.

3. TC 6, PVC and ABS Plastic Utilities Duct for Underground Installation.

G. National Fire Protection Association (NFPA): 70, National Electrical Code. (NEC)

H. Underwriters Laboratories, Inc. (UL):

1. 1, Standard for Safety Flexible Metal Conduit.

2. 6, Standard for Safety Rigid Metal Conduit.

3. 356, Standard for Safety Liquid-Tight Flexible Conduit.

4. 514B, Standard for Safety Fittings for Conduit and Outlet Boxes.

5. 514C, Standard for Safety Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers.

6. 651, Standard for Safety Schedule 40 and 80 PVC Conduit.

7. 651A, Standard for Safety Type EB and Rigid PVC Conduit and HDPF Conduit.

8. 797, Standard for Safety Electrical Metallic Tubing.

9. 870, Standard for Safety Wireways, Auxiliary Gutters, and Associated Fittings.

10. 1242, Standard for Safety Intermediate Metal Conduit.

11. 1660, Standard for Safety Liquid-Tight Flexible Nonmetallic Conduit.

PART 2 -- PRODUCTS

2.01 GENERAL

A. Pull and junction boxes, fittings, and other indicated enclosures that are dedicated to the raceway system shall comply with this Section.

2.02 CONDUIT

A. Rigid Aluminum (RAL) Conduits

1. Rigid aluminum conduit shall be manufactured of 6063 alloy, temper T-1.

2. Manufacturers, or Approved Equal

a. V.A.W. of America

b. Alcoa

B. Rigid Non-Metallic Conduit

1. Rigid non-metallic conduit shall be Schedule 80 PVC, sunlight resistant.

2. Rigid non-metallic conduit shall be manufactured in accordance with NEMA TC-2 - Electrical Plastic Tubing and Conduit, and UL-651 - Standard for Rigid Non-metallic Conduit.

3. UL listed for concrete encasement, underground direct burial, concealed or direct sunlight exposure, and 90 degrees C insulated conductors

4. Manufacturers, or Approved Equal

   a. Carlon

   b. Condux

C. Liquidtight Non-Metallic Flexible Conduit

1. Liquidtight flexible conduit shall be constructed of a flexible PVC Carflex with a sunlight resistant thermoplastic outer jacket.

2. Liquidtight flexible conduit shall be manufactured in accordance with UL-356 and UL Standard 1660 for non-metallic, liquid-tight flexible conduit.

3. Manufacturers, or Approved Equal

   a. Anaconda, Sealtite

   b. Electriflex, Liquidtite

D. Electrical Metallic Tubing (EMT) or Intermediate conduit (IMC) will not be accepted.

2.03 FITTINGS AND BOXES

A. General

1. Cast aluminum fittings for use with aluminum conduit shall be the threaded type with five full threads.

2. Fittings and boxes shall have neoprene gaskets and non-magnetic stainless steel screws. Covers shall be attached by means of holes tapped into the body of the fitting. Covers for fittings attached by means of clips or clamps will not be acceptable.

3. Boxes larger than standard cast or malleable types shall be 316 stainless steel, NEMA 4X.

4. In outdoor areas, conduit shall be terminated in rain-tight hubs as manufactured by Myers, O.Z. Gedney, Appleton, or approved equal. In other than outdoor areas, sealed locknuts and bushings shall be used.

5. Conduit, fittings, and boxes in hazardous locations shall be suitable for the Class and Division indicated.

6. Conduit Hubs shall be aluminum with insulated throat, double lock nuts, rain-tight.

7. Conduit sealing fittings shall be aluminum type EYF, EYM or ESU (Appleton) or equal.

B. Cast Aluminum Fittings and Boxes

1. Cast aluminum boxes and fittings shall have less than 0.40 percent copper content and shall be utilized with aluminum conduit.

2. Manufacturers, or Approved Equal

   a. O.Z. Gedney

   b. Appleton

   c. Crouse-Hinds

C. PVC Fittings and Boxes

1. Fittings for use with rigid non-metallic conduit shall be PVC, solvent welded type.

2. Boxes shall be PVC or fiberglass reinforced polyester (FRP).

3. Manufacturers, or Approved Equal

   a. Carlon

   b. Crouse-Hinds

   c. Hoffman

4. Provide welding solvent as required for installation of non-metallic conduit and fittings.

D. Stainless Steel Boxes

1. Stainless steel boxes shall be used with PVC coated RGS conduit.

2. Stainless steel boxes shall be NEMA 4X, Type 316.

3. Stainless steel shall be minimum 14-gauge thickness, with a brushed finish.

4. Doors shall have full length stainless steel piano hinges. Non-hinged boxes are not acceptable.

5. Manufacturers, or Approved Equal

   a. Hoffman

   b. Rohn

   c. Hammond

2.04 ACCESSORIES

A. Identification Devices:

1. Raceway Tags:

a. Material: Permanent, nylon.

b. Shape: Round.

c. Raceway Designation: Pressure stamped, embossed, or engraved.

d. Tags relying on adhesives or taped-on markers not permitted.

2. Warning Tape:

a. Material: Polyethylene, 4-mil gauge.

b. Color: Red.

c. Width: Minimum 6-inch.

d. Designation: Warning on tape that electric circuit is located below tape.

3. Manufacturers or Approved Equal:

a. Blackburn, Type RT.

b. Griffolyn Co.

PART 3 -- EXECUTION

3.01 GENERAL

A. Run all wiring in raceway unless indicated otherwise.

B. Install raceways between equipment as indicated. Raceway systems shall be electrically and mechanically complete before conductors are installed. Bends and offsets shall be smooth and symmetrical, and shall be accomplished with tools designed for this purpose. Factory elbows shall be utilized wherever possible. Crushed or deformed raceways are not permitted. Maintain raceway entirely free of obstructions and moisture. Immediately after installation, plug or cap raceway ends with watertight and dust-tight seals until time for pulling in conductors.

C. Avoid moisture traps where possible. When unavoidable in exposed conduit runs, provide junction box and drain fitting at conduit low point.

D. Where raceway routings are indicated on plan views, follow those routings to the extent possible. Group raceways together installed in same area.

E. Where raceways are indicated but routing is not shown, such as home runs or on conduit developments and schedules, raceway routings shall be the Electrical Subcontractor's choice and in strict accordance with the NEC and customary installation practice. Raceway shall be encased, exposed, concealed, or under floor as indicated, except that conduit in finished areas shall be concealed unless specifically indicated otherwise.

F. Adjust routings to avoid obstructions. Coordinate between trades prior to installation of raceways. Lack of such coordination shall not be justification for extra compensation,

and removal and re-installation to resolve conflicts shall be by the Electrical Subcontractor as part of the Work. Maintain a minimum of 24 inches separation between raceways and piping.

G. Install exposed raceways parallel or perpendicular to structural beams. Follow contours of when running exposed raceways and avoid obstruction of passageways.

H. Install expansion fittings with bonding jumpers wherever raceways cross building expansion joints.

I. Install exposed raceways at least 1/2-inch from walls or ceilings except at locations above finished grade where damp conditions do not prevail. In such locations, install exposed raceways 1/4-inch minimum from the face of walls or ceilings by the use of clamp backs or struts.

J. Wherever contact with concrete or dissimilar metals can produce galvanic corrosion of equipment, provide suitable insulating means to prevent such corrosion.

3.02 CONDUIT

A. Outdoor exposed conduit shall be rigid aluminum.

B. Indoor exposed conduit shall be rigid aluminum.

C. Conduit concealed, buried, or encased in concrete shall be Schedule 80 PVC. Where conduit emerges from concrete encasement use a Schedule 80 PVC long radius elbow and riser for transition from the concrete. Conduit shall emerge from the concrete perpendicular to the surface whenever possible. Conduits that are stubbed-up inside pull boxes shall extend a minimum of 6 inches into the box.

D. Exposed conduit shall be 3/4-inch minimum trade size. Encased conduit shall be one-inch minimum trade size. Install supports at distances required by the NEC.

E. Conduit shall not be encased in the bottom floor slab below grade.

F. Concrete cover for conduit and fittings shall not be less than 1-1/2 inches for concrete exposed to earth or weather, or less than 3/4-inch for concrete not exposed to weather or in contact with the ground.

G. Conduits passing through a slab, wall, or beam shall not impair significantly the strength of the construction.

H. Conduits run on block walls shall not be installed in same horizontal course with reinforcing steel.

I. All empty conduits stub-up inside boxes, cabinets or interior building spaces shall terminate with a plugged threaded fitting.

J. Tag empty conduits at both ends to indicate the final destination. Where it is not possible to tag the conduit, destination shall be identified by a durable marking on an

adjacent surface. A non-metallic pull-cord shall also be installed in each empty conduit. This shall apply to conduits in floors, panels, manholes, boxes, cabinets, equipment, etc.

3.03 INSTALLATION IN CAST-IN-PLACE STRUCTURAL CONCRETE

A. Minimum cover 1-1/2 inches.

B. Provide support during placement of concrete to ensure raceways remain in position.

C. Floor Slabs:

1. Outside diameter of conduit not to exceed one-third of the slab thickness.

2. Separate conduit by minimum six times conduit outside diameter, except at crossings.

3.04 CONNECTIONS

A. Provide flexible connections to motorized equipment to minimize vibration.

B. Conduit Size 4 Inches or less: Flexible non-metallic, liquid-tight conduit.

C. Length: 18-inch minimum, 60-inch maximum, of sufficient length to allow movement or adjustment of equipment.

D. Transition from Underground or Concrete Embedded to Exposed: Schedule 80 PVC to 6” below top of concrete then transition to rigid aluminum conduit coated with protective epoxy coating through concrete.

3.05 PENETRATIONS

A. Make at right angles, unless otherwise shown.

B. Notching or penetration of structural members, including footings and beams, is not permitted.

C. Fire-Rated Walls, Floors, or Ceilings: Fire-stop openings around penetrations to maintain fire-resistance rating.

D. Apply single layer of wraparound duct band to all metallic conduit in contact with concrete floor slabs to a point 2 inches above concrete surface.

E. Concrete Walls, Floors, or Ceilings (Aboveground): Provide non-shrink grout dry-pack, or use watertight seal device.

F. Entering Structures or Buildings: Seal raceway at the first box or outlet with minimum 2 inches thick expandable plastic compound to prevent the entrance of gases or liquids from one area to another.

3.06 SUPPORTS

A. Support from structural members only, at intervals not exceeding NFPA 70 (NEC) requirements, and in any case not exceeding 8 feet. Do not support from piping, pipe supports, or other raceways.

B. Multiple Adjacent Raceways: Provide ceiling trapeze. For trapeze-supported conduit, allow 40 percent extra space for future conduit.

C. Provide and attach wall brackets, strap hangers, or ceiling trapeze as follows:

1. Wood: Wood screws.

2. Hollow Masonry Units: Toggle bolts.

3. Concrete or Brick: Expansion shields, or threaded studs driven in by powder charge, with lock washers and nuts.

4. Metalwork: Machine screws.

D. Nails or wooden plugs inserted in concrete or masonry for attaching raceway not permitted. Do not weld raceways or pipe straps to steel structures. Do not use wire in lieu of straps or hangers.

E. Support devices and fastener hardware shall be aluminum or 316 stainless steel.

3.07 ENDS

A. Install concealed raceways with a minimum of bends in the shortest practical distance.

B. Make bends and offsets of longest practical radius.

C. Install with symmetrical bends or cast metal fittings.

D. Avoid field-made bends and offsets, but where necessary, make with acceptable hickey or bending machine. Do not heat metal raceways to facilitate bending.

E. Make bends in parallel or banked runs from same center or centerline with same radius so that bends are parallel.

F. Factory elbows may be installed in parallel or banked raceways if there is change in plane of run, and raceways are same size.

G. PVC Conduit: Bends 30-Degree and larger: Provide factory-made elbows.

H. 90-Degree Bends: Provide rigid aluminum elbows.

I. Use manufacturer's recommended method for forming smaller bends.

J. Flexible Conduit: Do not make bends that exceed allowable conductor bending radius of cable to be installed or that significantly restricts conduit flexibility.

3.08 EXPANSION / DEFLECTION FITTINGS

A. Provide on all raceways at all structural expansion joints, and in long tangential runs.

B. Provide expansion/deflection joints for 50 degrees F maximum temperature variation.

C. Install in accordance with manufacturer's instructions.

3.09 PVC CONDUIT

A. Solvent Welding:

1. Provide manufacturer recommended solvent; apply to all joints.
2. Install such that joint is watertight.

B. Adapters:

1. PVC to Metallic Fittings: PVC terminal type.
2. PVC to Rigid Metal Conduit or IMC: PVC female adapter.

C. Belled-End Conduit: Bevel the un-belled end of the joint prior to joining.

3.10 TERMINATIONS AT ENCLOSURES

A. Cast Metal Enclosure: Provide manufacturer's pre-molded insulating sleeve inside metallic conduit terminating in threaded hubs.

B. NEMA 4X Enclosures: Provide conduit hubs

C. Sheet Metal Boxes, Cabinets, and Enclosures:

1. Rigid Aluminum Conduit:
   a. Provide one lock nut each on inside and outside of enclosure.
   b. Install grounding bushing.
   c. Provide bonding jumper from grounding bushing to equipment ground bus or ground pad; if neither ground bus nor pad exists, connect jumper to lag bolt attached to metal enclosure.
   d. Install insulated bushing on ends of conduit where grounding is not required.
   e. Provide insulated throat when conduit terminates in sheet metal boxes having threaded hubs.
2. Flexible, Nonmetallic Conduit: Provide nonmetallic, liquid-tight strain relief connectors.
3. PVC Schedule 80 Conduit: Provide PVC terminal adapter with lock nut.

D. Motor Control Center, Switchboard, Switchgear, and Free-Standing Enclosures: Terminate conduit entering bottom with grounding bushing; provide a grounding jumper extending to equipment ground bus or grounding pad.

3.11 UNDERGROUND RACEWAYS

A. Grade: Maintain minimum grade of 4 inches in 100 feet, either from one pull box to the next, or from a high point between them, depending on surface contour.

B. Cover: Maintain minimum 2-foot cover above conduit and concrete encasement, unless otherwise shown.

C. Make routing changes as necessary to avoid obstructions or conflicts.

D. Couplings: In multiple conduit runs, stagger so that couplings in adjacent runs are not in same transverse line.

E. Union type fittings not permitted.

F. Spacers:

1. Provide preformed, nonmetallic spacers, designed for such purpose, to secure and separate parallel conduit runs in a trench or concrete encasement.

2. Install at intervals not greater than that specified in NFPA 70 for support of the type conduit used, but in no case greater than 6 feet.

G. Support conduit so as to prevent bending or displacement during backfilling or concrete placement.

H. Installation with Other Piping Systems - Crossings: Maintain minimum 24-inch vertical separation. Parallel Runs: Maintain minimum 24-inch separation, unless noted otherwise on the drawings. Installation over valves or couplings not permitted.

I. Metallic Raceway Coating: At couplings and joints and along entire length, apply wraparound duct band with one-half tape width overlap to obtain two complete layers.

J. Concrete Encasement: As specified in Section 03300, Cast-In-Place Concrete.

K. Concrete Color: Gray, dust top of concrete duct-bank with powdered red concrete dye before concrete sets and trowel dry onto top of duct-bank.

L. Backfill: As specified in Section 02222, Excavation and Backfill for Utilities. Do not backfill until inspected by ENGINEER.

3.12 EMPTY RACEWAYS

A. Provide permanent, removable cap over each end.

B. Provide PVC plug with pull-tab for underground raceways with end bells.

C. Provide nylon pull cord.

D. Identify, as specified in Paragraph IDENTIFICATION DEVICES, with waterproof tags attached to pull cord at each end, and at intermediate pull point.

3.13 IDENTIFICATION DEVICES

A. Raceway Tags: Identify origin and destination.

B. Install at each terminus, near midpoint, and at minimum intervals of every 50 feet of exposed Raceway, whether in ceiling space or surface mounted.

C. Provide nylon strap for attachment.

D. Warning Tape: Install approximately 12 inches above underground or concrete-encased raceways. Align parallel to, and within 12 inches of, centerline of runs.

E. Buried Raceway Markers: Install at grade to indicate direction of underground raceways. Install at all bends and at intervals not exceeding 100 feet in straight runs. Embed and secure to top of concrete base, sized 14 inches long, 6 inches wide, and 8 inches deep; top set flush with finished grade.

3.14 PROTECTION OF INSTALLED WORK

A. Protect products from effects of moisture, corrosion, and physical damage during construction.

B. Provide and maintain manufactured watertight and dust-tight seals over all conduit openings during construction.

C. Touch up painted conduit threads after assembly to cover nicks or scars.

D. Touch up damage to coating on PVC-coated conduit with patching compound approved by manufacturer.

- END OF SECTION -

SECTION 16120

CONDUCTORS AND CABLES

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Electrical Subcontractor shall provide wires and cable, complete and operable, in accordance with the Contract Documents.

1.02 SUBMITTALS

A. The Electrical Subcontractor shall submit Shop Drawings in accordance with Section 16010, Electrical General Provisions and Special Provisions.

1.03 REFERENCES

A. The following is a list of standards that may be referenced in this section:

1. American National Standards Institute (ANSI): 386, Standard for Separable Insulated Connector Systems for Power Distribution Systems Above 600V.

2. American Society for Testing and Materials (ASTM):

   a. A167, Standard Specification for Stainless and Heat Resisting Chromium-Nickel-Plated Steel Plate, Sheet, and Strip.

   b. B3, Standard Specification for Soft or Annealed Copper Wire.

   c. B8, Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.

   d. B263, Standard Test Method for Determination of Cross-Sectional Area of Stranded Conductors.

3. Insulated Cable Engineer's Association, Inc. (ICEA): T-29-250, Procedure for Conducting Vertical Cable Tray Flame Test with a Theoretical Heat Input of 210,000 Btu/hour.

4. Institute of Electrical and Electronics Engineers, Inc. (IEEE):

   a. 48, Standard Test Procedures and Requirements or High-Voltage Alternating Current Cable Terminations.

5. National Electrical Contractors Association, Inc. (NECA): 5055, Standard of Installation.

6. National Electrical Manufacturers' Association (NEMA):

   a. CC 1, Electric Power Connectors for Substations.

   b. WC 3, Rubber-insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

   c. WC 5, Thermoplastic Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

   d. WC 7, Cross-linked Thermosetting Polyethylene insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

   e. WC 8, Ethylene-Propylene-Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

   f. WC 55, Instrumentation Cables and Thermocouple Wire.

7. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC).

8. Underwriters Laboratories, Inc. (UL):

   a. 13, Standard for Safety Power-Limited Circuit Cables.

   b. 44, Standard for Safety Rubber-Insulated Wires and Cables.

   c. 62, Standard for Safety Flexible Cord and Fixture Wire.

   d. 486A, Standard for Safety Wire Connector and Soldering Lugs for Use with Copper Conductors.

   e. 486B, Standard for Safety Wire Connectors and Soldering Lugs for Use with Aluminum Conductors.

   f. 510, Standard for Safety Insulating Tape.

   g. 854, Standard for Safety Service-Entrance Cables.

   h. 1581, Standard for Safety Reference Standard for Electrical Wires, Cables, and Flexible Cords.

PART 2 -- PRODUCTS

2.01 GENERAL

A. Conductors, including grounding conductors, shall be copper. Aluminum conductor wire and cable will not be permitted. Insulation shall bear UL label, the manufacturer's trademark, and identify the type, voltage, and conductor size. All conductors except

flexible cords and cables, fixture wires, and conductors that form an integral part of equipment such as motors and controllers shall conform to the requirements of Article 310 of the National Electric Code, latest edition, for current carrying capacity. Flexible cords and cables shall conform to Article 400, and fixture wires shall conform to Article 402. Wiring shall have wire markers at each end.

2.02 600 VOLT RATED WIRE AND CABLE

A. Power and Lighting Wire:

1. For wire rated for 600 volts in duct or conduit for all power and lighting circuits, use Class B Type THHN or THWN conforming to UL-44 - UL Standard for Thermoset-Insulated Wires and Cables up to #10 size wire, and use Type XHHW-2 for #8 and larger cable and cable passing below grade or slabs.

2. Size conductors for feeders as defined in Article 100 of the NEC to prevent a voltage drop exceeding 3 percent at the farthest outlet of power, heating, and lighting loads, or combinations of such loads, and where the maximum total voltage drop on both feeders and branch circuits to the farthest connected load does not exceed 5 percent.

3. Size conductors for branch circuits, as defined in Article 100 of the NEC, to prevent voltage drop exceeding 3 percent at the farthest connected load or combinations of such loads and where the maximum total voltage drop on both feeders and branch circuits to the farthest connected load does not exceed 5 percent.

4. Use Minimum #10 AWG stranded copper conductors for all 120 or 277 volt branch circuits. Use minimum #6 AWG stranded copper conductor for all 480 volt circuits/loads.

5. Wiring for 600 volt class power and lighting shall be as manufactured by Hi-Tech Cable Corp., Collyer Insulated Wire Col., Okonite Co., American Insulated Wire Corp., or Triangle PWC, Inc.

2.03 CONTROL CABLES

A. Multi-conductor control cables - General.

1. Conductors:

a. No. 14 AWG, seven-strand copper.

b. Insulation: 15-mil PVC with 4-mil nylon.

c. UL 1581 listed as Type THHN/THWN rated VW-I.

d. Conductor group bound with spiral wrap of barrier tape.

e. Color Code: In accordance with NEMA WC 5, Method 1, Sequence K-2.

2. Cable: Passes the ICEA T-29-520 210,000 Btu/hr Vertical Tray Flame Test.

3. Cable Sizes:

No. of Conductors	Max. Outside Diameter (inches)	Jacket Thickness (mils)
3	0.41	45
5	0.48	45
7	0.52	45
12	0.72	60
19	00.83	60
25	1.00	60
37	1.15	80

4. Manufacturers or Approved Equal:

   a. Okonite Co.

   b. American Insulated Wire Corp.

   c. Eaton Corp.

   d. Polyset.

   e. Triangle PWC, Inc.

B. Shielded control cable - No. 16 AWG, Twisted, Shielded Pair, Instrumentation Cable: Single pair, designed for noise rejection for process control, computer, or data log applications meeting NEMA WC 55 requirements.

1. Outer Jacket: 45-mil nominal thickness.

2. Individual Pair Shield: 1.35-mil, double-faced aluminum/synthetic polymer overlapped to provide 100 percent coverage.

3. Dimension: 0.31-inch nominal OD.

4. Conductors:

   a. Bare soft annealed copper, Class B, seven-strand concentric, meeting requirements of ASTM B8

   b. 20 AWG, seven-strand tinned copper drain wire.

   c. Insulation: 15-mil nominal PVC, 600V rated.

   d. Jacket: 4-mil nominal nylon.

   e. Color Code: Pair conductors black and red.

5. Manufacturers or Approved Equal:

   a. Okonite Co.

   b. American Insulated Wire Corp.

   c. Eaton Corp.

   d. Polyset.

   e. Triangle PWC, Inc.

C. Triad cable - No. 16 AWG, Twisted, Shielded Triad Instrumentation Cable: Single triad, designed for noise rejection for process control, computer, or data log applications meeting NEMA WC 55 requirements.

   1. Outer Jacket: 45-mil nominal.

   2. Triad Shield: 1.35-mil, double-faced aluminum/synthetic polymer, overlapped to provide 100 percent coverage.

   3. Dimension: 0.32-inch nominal OD.

   4. Conductors:

      a. Bare soft annealed copper, Class B, seven-strand concentric, meeting requirements of ASTM B8.

      b. 20 AWG, seven-strand, tinned copper drain wire.

      c. Insulation: 15-mil nominal PVC.

      d. Jacket: 4-mil nylon.

      e. Color Code: Triad conductors: black, red, and blue.

   5. Manufacturers or Approved Equal

      a. Okonite Co.

      b. American Insulated Wire Corp.

      c. Eaton Corp.

      d. Polyset.

      e. Triangle PWC, Inc.

D. Shielded (single & overall) control cable - No. 18 AWG, Multi-Twisted, Shielded Pairs with a Common, Overall Shield Instrumentation Cable: Designed for use as

instrumentation, process control, and computer cable, meeting NEMA WC 55 requirements.

1. Conductors:

   a. Bare soft annealed copper, Class B, seven-strand concentric, in accordance with ASTM B8

   b. Tinned copper drain wires.

   c. Pair drain wire size AWG 20, group drain wire size AWG 18.

   d. Insulation: 15-mil PVC.

   e. Jacket: 4-mil nylon.

   f. Color Code: Pair conductors black and red with red conductor numerically printed for group identification.

   g. Individual Pair Shield: 1.35-mil, double-faced aluminum/synthetic polymer.

2. Cable Shield: 2.35-mil, double-faced aluminum/synthetic polymer, overlapped for 100 percent coverage.

3. Cable Sizes:

Number of Pairs	Maximum Outside Diameter (inches)	Nominal Jacket Thickness (mils)
4	0.50	45
8	0.68	60
12	0.82	60
16	0.95	80
24	1.16	80
36	1.33	80
50	1.56	80

4. Manufacturers or Approved Equal:

   a. Okonite Co.

   b. American Insulated Wire Corp.

   c. Eaton Corp.

d. Polyset.

e. Triangle PWC, Inc.

E. Multi-twisted Pairs (No. 18 AWG) with a Common Overall Shield Instrumentation Cable: Designed for use as instrumentation, process control, and computer cable meeting NEMA WC 55.

1. Conductors:

a. Bare soft annealed copper, Class B, seven-strand concentric, in accordance with ASTM B8.

b. Tinned copper drain wire size 18 AWG

c. Insulation: 15-mil nominal PVC.

d. Jacket: 4-mil nylon.

e. Color Code: Pair conductors black and red, with red conductor numerically printed for group identification.

2. Cable Shield: 2.35-mil, double-faced aluminum/synthetic polymer, overlapped for 100 percent coverage.

3. Cable Sizes:

Number of Pairs	Maximum Outside Diameter (inches)	Nominal Jacket Thickness (mils)
4	0.46	45
8	0.63	60
12	0.75	60
16	0.83	60
24	1.06	80
36	1.21	80
50	1.42	80

4. Manufacturers or Approved Equal:

a. Okonite Co.

b. American Insulated Wire Corp.

c. Eaton Corp.

d. Polyset.

e. Triangle PWC, Inc.

2.04 CABLE TERMINATIONS

A. Compression connectors shall be Burndy "Hi Lug", Thomas & Betts "Sta-Kon,", or Approved Equal. Threaded connectors shall be split bolt type of high strength copper alloy. Pressure type, twist-on connectors will not be acceptable.

B. Pre-insulated fork tongue lugs shall be Thomas & Betts, Burndy, or Approved Equal.

C. General purpose insulating tape shall be Scotch No. 33, Plymouth "Slip-knot", or equal. High temperature tape shall be polyvinyl as manufactured by Plymouth, 3M, or Approved Equal.

D. Labels for coding 600 volt wiring shall be computer printable or pre-printed, self-laminating, self-sticking, as manufactured by W.H. Brady, 3M, or Approved Equal.

E. Stress cone material for make-up of medium voltage shielded cable shall be as manufactured by Raychem, 3M, or Approved Equal.

2.05 GROUNDING CONDUCTORS

A. Equipment: Stranded copper with green, Type USE/RHH/RHW-XLPE or THHN/THWN, insulation.

B. Direct Buried: Bare stranded tinned copper.

2.06 ACCESSORIES FOR CONDUCTORS 600 VOLTS AND BELOW

A. Tape:

1. General Purpose, Flame-Retardant: 7-mil, vinyl plastic, Scotch Brand 33, rated for 90 degrees C minimum, meeting requirements of UL 510.

2. Flame Retardant, Cold and Weather Resistant: 8.5-mil, vinyl plastic, Scotch Brand 88.

3. Arc and Fireproofing:

a. 30-mil, elastomer

b. Manufacturers and Products:

(1) Scotch; Brand 77, with Scotch Brand 69 glass cloth tape binder.

(2) Plymount; Plyarc 30, with Plymount Plyglas glass cloth tape binder.

B. Identification Devices:

1. Sleeve: Permanent, PVC, yellow or white, with legible machine-printed black markings.

2. Marker Plate: Nylon, with legible designations permanently hot stamped on plate.

3. Grounding Conductor: Permanent green heat-shrink sleeve, 2-inch minimum.

C. Connectors and Terminations:

1. Nylon, Self-Insulated Crimp Connectors:

a. Manufacturers and Products:

(1) Thomas & Betts; Sta-Kon.

(2) Burndy; Insulink.

(3) ILSCO.

2. Nylon, Self-Insulated, Crimp Locking-Fork, Torque-Type Terminator:

a. Manufacturers and Products:

(1) Thomas & Betts; Sta-Kon.

(2) Burndy; Insulink.

(3) ILSCO.

D. Cable Lugs:

1. In accordance with NEMA CC I.

2. Rated 600 volts of same material as conductor metal.

3. Insulated, Locking-Fork, Compression Lugs:

a. Manufacturers and Products:

(1) Thomas & Betts; Sta-Kon.

(2) ILSCO; ILSCONS.

4. Un-insulated Crimp Connectors and Terminators:

a. Manufacturers and Products:

(1) Square D; Versitide.

(2) Thomas & Betts; Color-Keyed.

(3) ILSCO.

5. Un-insulated, Bolted, Two-Way Connectors and Terminators:

a. Manufacturers and Products:

(1) Thomas & Betts; Locktite.

(2) Burndy; Quiklug.

(3) ILSCO.

E. Cable Ties: Nylon, adjustable, self-locking, and reusable.

1. Manufacturer and Product: Thomas & Betts; TY-RAP.

F. Heat Shrinkable Insulation: Thermally stabilized, cross-linked polyofin.

1. Manufacturer and Product: Thomas & Betts; SHRINK-KON.

2.07 PULLING COMPOUND

A. Nontoxic, non-corrosive, noncombustible, nonflammable, wax-based lubricant; UL listed.

B. Suitable for rubber, neoprene, PVC, polyethylene, hypalon, CPE, and lead-covered wire and cable.

C. Suitable for zinc-coated steel, aluminum, PVC, bituminized fiber, and fiberglass raceways.

D. Manufacturers and Products:

1. Ideal Co.; Yellow 77.

2. Polywater, Inc.

3. Cable Grip Co.

PART 3 -- EXECUTION

3.01 GENERAL

A. The Electrical Subcontractor shall provide and terminate all power, control, and instrumentation conductors except where indicated.

3.02 INSTALLATION

A. Do not pull conductors into raceway until raceway has been cleared of moisture and debris.

B. Pulling tensions on raceway cables shall be within the limits recommended by the cable manufacturer. Wire pulling lubricant, where needed, shall be UL approved.

C. Do not run instrumentation wire in the same raceway with power and control wiring except where specifically indicated.

D. Neatly group wire in panels, cabinets, and wireways using nylon tie straps, and shall be fanned out to terminals. Tighten screws and terminal bolts in accordance with UL 486A for copper conductors.

1. Bundling: Where single conductors and cables in manholes, hand-holes, vaults, and other indicated locations are not wrapped together by some other means, bundle conductors from each conduit throughout their exposed length with cable ties placed at intervals not exceeding 12 inches on center.

2. Ream, remove burrs, and clear interior of installed conduit before pulling wires or cables. Concrete-Encased Raceway Installation: Before installation of conductors, pull through each raceway a mandrel approximately 1/4-inch smaller than raceway inside diameter.

3.03 SPLICES AND TERMINATIONS

A. General

1. Properly tape and insulate wire tap terminations according to their respective classes.

2. No cable splices shall be allowed. Extend all cables full length from termination point to termination point.

3. Terminate stranded conductors directly on equipment box lugs making sure that all conductor strands are confined within lug. Use forked-tongue lugs where equipment box lugs have not been provided.

4. Properly tape and terminate excess control and instrumentation wire as spares.

B. Control Wire and Cable

1. Terminate control conductors only at the locations indicated and only on terminal strips or terminal lugs of vendor furnished equipment.

2. Terminate in-junction boxes, motor control centers, and control panels, control wire and spare wire to terminal strips.

C. Instrumentation Wire and Cable

1. Ground shielded instrumentation cables at one end only, preferably the receiving end on a 4-20 mA system.

2. Install shielded cables in conduit runs with sufficient cable length to avoid need for splicing.

D. Power Wire and Cable

1. Terminate all 120/208-volt, 120/240-volt, and 480/277-volt branch circuit conductors only at equipment terminals indicated.

2. Wrap motor lead connections in motor terminal boxes with mastic material to form a mold and then tape with a minimum of two layers of varnished cambric tape overtaped with a minimum of two layers of high temperature tape.

3. Terminate shielded power cable with pre-assembled stress cones in a manner approved by the cable and terminal manufacturer. The Electrical Subcontractor shall submit the proposed termination procedure as a Shop Drawing.

3.04 CABLE IDENTIFICATION

A. General: Identify wires and cables for proper control of circuits and equipment and to reduce maintenance effort.

B. Identification Numbers: The Electrical Subcontractor shall assign to each control and instrumentation wire and cable a unique identification number. Assign numbers to all conductors having common terminals and shall be shown on "as built" drawings. Identification numbers shall appear within 3-inches of conductor terminals. "Control Conductor" shall be defined as any conductor used for alarm, annunciator, or signal purposes.

1. Assign multiconductor cable a number and use it to label the cable at intermediate pull boxes and at stub-up locations beneath free-standing equipment. It is expected that the cable number shall form a part of the individual wire number. Individual control conductors and instrumentation cable shall be identified at pull points as described above. The instrumentation cable numbers shall incorporate the loop numbers assigned in the Contract Documents.

2. Color code all 120/208-volt system feeder cables and branch circuit conductors as follows: Phase A - black, Phase B - red, Phase C - blue, and Neutral - white. The 480/277-volt system conductors shall be color coded as follows: Phase A - Brown, Phase B - Orange, Phase C - Yellow, and Neutral - Gray. Use color coding tape where colored insulation is not available. Branch circuit switch shall be yellow. Insulated ground wire shall be green, and neutral shall be gray. Keep color coding and phasing consistent throughout the Site, but connect bars at panelboards, switchboards, and motor control centers Phase A-B-C, top to bottom, or left to right, facing connecting lugs.

3. General purpose AC control cables shall be red. General purpose DC control cables shall be blue.

4. Terminate spare cable on terminal screws and shall be identified with a unique number as well as with destination.

5. Identify terminal strips by computer printable, cloth, self-sticking marker strips attached under the terminal strip.

3.05 TESTING

A. Cable Assembly and Testing: Cable assembly and testing shall comply with applicable requirements of ICEA Publication No. S-68-516 - Ethylene-Propylene-Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy. Factory test results shall be submitted in accordance with Section 01300 prior to shipment of cable. The following field tests shall be the minimum requirements:

1. Insulation resistance testing, using a DC megohmeter, shall be performed on all cables operating at more than 250 volts to ground. Time-resistance readings shall be taken and recorded at intervals of 30 seconds and one minute; over a five minute duration. Time-resistance voltage levels shall be per the cable manufacturer's recommendations.

2. Power cable rated at 600 volts shall be tested for insulation resistance between phases and from each phase to a ground using a megohmeter.

3. Field testing shall be done after cables are installed in the raceways.

4. Field tests shall be performed by a certified test organization acceptable to the cable manufacturer. Test results shall be submitted to the Engineer for review and acceptance.

5. Cables failing the tests shall be replaced with a new cable or be repaired. Repair methods shall be as recommended by the cable manufacturer and shall be performed by persons certified by the industry.

B. Continuity Test: Control and instrumentation cables shall be tested for continuity, polarity, undesirable ground, and origination. Such tests shall be performed after installation and prior to placing cables in service.

- END OF SECTION –

SECTION 17000

INSTRUMENTS AND CONTROL PROGRAMMING REQUIREMENTS

PART 1 -- GENERAL

1.01 SCOPE

A. The INSTRUMENTATION SUBCONTRACTOR shall provide all programming as defined herein and shall supply the new field instruments as listed herein and noted on the Drawings.

B. Programming shall be performed using the standards set by City of Venice.

C. The scope of the work to be performed under this Section includes, as a minimum:

1. The CONTRACTOR shall retain overall responsibility for the modifications to the plant instrumentation and control system as specified herein.

2. The CONTRACTOR shall be responsible to install all new instruments as specified herein and as indicated on the Drawings.

3. The CONTRACTOR shall furnish and install new instrument supports and mounting hardware.

4. The ELECTRICAL SUBCONTRACTOR shall provide final termination and testing of all instrumentation and control system signal wiring and power supply wiring at all equipment furnished or modified under this project.

5. The INSTRUMENTATION SUBCONTRACTOR shall furnish and install transient voltage surge suppression systems for all new analog instruments.

6. The INSTRUMENTATION SUBCONTRACTOR shall provide testing, calibration, training and startup services as specified herein.

7. The INSTRUMENTATION SUBCONTRACTOR shall provide the necessary programming changes and hardware modifications to the facility's plant workstation operator interface software as described herein to fully incorporate with the instruments and equipment supplied under this project. This includes a new air flow meter supplied under this section and incorporation of the control interface with two new blowers. Control interface is through an Ethernet link from a new control panel PLC being supplied under Section 11185 connected via fiber optic communications to an existing network switch in an existing plant control panel as noted on the Drawings. The INSTRUMENTATION SUBCONTRACTOR shall be responsible to fully integrate the control interface between the existing HMI and the new PLC in the new control panel.

8. The INSTRUMENTATION SUBCONTRACTOR shall copy, download, and fully place in working order, the modified iFIX application program onto a new HMI industrial workstation that is being supplied with the new control panel furnished with the blowers under Section 11185.

9. The CONTRACTOR may elect to expand the scope of work for the INSTRUMENTATION SUBCONTRACTOR to include the new blower control panel specified under Section 11185. Regardless of who fabricates the new panel, the CONTRACTOR shall remain fully responsible for the new blowers meeting all specified performance and control requirements.

1.02 ANALOG SIGNAL TRANSMISSION

A. Signal transmission between electric or electronic instruments, controllers, and all equipment and control devices shall be linear 4-20 milliamperes and shall operate at 24 volts D.C. Signal isolation and/or conversion shall be provided where necessary to interface with instrumentation, equipment controls, panels and appurtenances.

B. Signal output from all transmitters and controllers shall be current regulated and shall not be affected by changes in load resistance within the unit's rating.

C. All cable shields shall be grounded <u>at one end only</u>, at the control panel, with terminals bonded to the panel ground bus.

1.03 DISCRETE INPUTS

A. All discrete inputs from field devices shall be dry contacts in the field device or equipment, powered from the signal source with isolation to the PLC inputs.

B. Sensing power (wetting voltage) shall be 120V AC.

1.04 DISCRETE OUTPUTS

A. All discrete outputs to field devices shall be through isolation relays in the control panel. Contacts on the relays are to be used to interface with the new motor starters.

1.05 INSTRUMENT AND HARDWARE SUBMITTALS

A. Submit information for all new hardware including, but not limited to, the following:

1. Product (item) name and tag number.

2. Catalog cuts.

3. Manufacturer's complete model number.

4. Location of the device.

5. Input - output characteristics.

6. Range, size, and graduations.

7. Physical size with dimensions, NEMA enclosure classification and mounting details.

8. Materials of construction of all enclosures, wetted parts and major components.

9. Instrument or control device sizing calculations where applicable.

10. Certified calibration data on all flow metering devices.

11. Environmental requirements during storage and operation.

12. Associated surge protection devices.

13. Mounting requirements.

14. Environmental requirements during storage and operation.

15. Complete panel fabrication shop drawings including panel layouts and wiring diagrams.

1.06 SOFTWARE SUBMITTALS

A. Software submittals shall include the following as a minimum:

1. PLC input/output schedules for interface with values being sent to and received from the blower panel PLC for new field I/O and internal data registers. List complete addresses and tagnames for each new register.

2. Existing plant workstation human machine interface software (HMI) new database points including HMI tagname, corresponding PLC register cross reference, scales, functions, etc.

3. Written control strategy documentation to describe the proposed control logic interface with the new signals logic.

4. Upon approval of PLC input/output schedules, new HMI database point list, and written control strategy documentation, submit a complete hard copy of proposed HMI display screen modifications.

1.07 OPERATION AND MAINTENANCE MANUALS

A. Provide equipment operation and maintenance manuals for new instruments. The manuals shall contain all illustrations, detailed drawings, wiring diagrams, and instructions necessary for installing, operating, and maintaining the equipment. The illustrated parts shall be numbered for identification. All modifications to manufacturer standard equipment and/or components shall be clearly identified and shown on the drawings and schematics. All information contained therein shall apply specifically to the equipment furnished and shall

only include instructions that are applicable. All such illustrations shall be incorporated within the printing of the page to form a durable and permanent reference book.

B. The manuals shall be prepared specifically for this installation and shall include all required cuts, drawings, equipment lists, descriptions, etc. that are required to instruct operation and maintenance personnel unfamiliar with such equipment. The maintenance instructions shall include trouble shooting data and full preventive maintenance schedules. The instructions shall be bound in locking 3-D-ring binders with bindings no larger than 3.5 inches and CD's with PDF files shall be provided. The manuals shall include 15% spare space for the addition of future material. The instructions shall include Drawings reduced or folded and shall provide at least the following as a minimum.

1.08 FINAL SYSTEM DOCUMENTATION

A. Provide two copies on CD-ROM for all software modifications for the HMI system (actual program files and pdf copies).

1.09 INSTALLATION

A. All instrumentation and control system installation work shall conform to all applicable codes and standards and be in accordance with manufacturer's recommendations.

B. All labor shall be performed by qualified craftsmen in accordance with the standards of workmanship in their profession and shall have had a minimum of five years of documented experience on similar projects.

C. All equipment and materials shall fit properly in their installations. Any required work to correct improperly fit installations shall be performed at no additional expense to the Owner.

D. The CONTRACTOR shall provide all required cutting, drilling, inserts, supports, bolts, and anchors, and shall securely attach all equipment and materials to their supports. All supports and hardware shall be Type 316 stainless steel.

1.10 OPERATOR TRAINING

A. Provide a minimum of two sessions, each approximately 2 hours in duration, to train operations staff on the new controls.

1.11 CONTROL SYSTEM SUPPLIER

A. The INSTRUMENTATION SUBCONTRACTOR's scope of work for field work may be performed by any qualified electrical or instrumentation subcontractor experienced with municipal domestic wastewater treatment plant control system work.

B. The existing plant SCADA system human machine interface (HMI) software is iFIX. The new PLC provided with the blower control panel under Section 11185 is a Modicon M340 using Unity 8.1 programming software. The existing plant control panel that will interface with the new PLC was fabricated and installed recently by C2I (Smyrna, GA).

C. The CONTRACTOR shall employ a qualified system integrator to implement the needed modifications to the iFIX displays and database for complete interface with the new PLC for the blowers. Qualified system integrators are Curry Controls (Lakeland, FL), Rocha Controls (Tampa, FL), KW Controls (Venice, FL), C2I (Smyrna, GA), and CEC Controls (Bradenton, FL). SCADA interface shall follow standard Owner practices for iFIX development and shall provide full interface with the new equipment as specified herein.

PART 2 -- PRODUCTS

2.01 PRODUCTS AND PROGRAMMING REQUIREMENTS

A. Programming software for the plant workstation iFIX displays shall be completed using the Owner's standard, existing programming software, current version.

B. Transient Voltage Surge Suppressors (TVSS): Provide field surge protection for the analog outputs from the DP flow transmitter instrument, PipeTrab 2-wire Phoenix Contact 2818122.

C. Programming Requirements:

1. BLOWER CONTROL – As supplied by Vendor-supplied control panel, see Section 11185. Provide interface with the new PLC in this new control panel to allow full monitoring and manual control from the plant HMI.

D. EQUIPMENT LOCAL CONTROL:
- Hand/Off/Remote selector switch at the local control panel

E. HMI DISPLAY:
- Hand/Off/Auto selection for each blower from HMI
- Manual Start/Stop command for each blower from HMI
- Manual Speed reference setting for each blower from HMI
- Run Status for each blower
- In Remote Status for each blower
- Speed feedback for each blower
- Runtime (in hours and tenths of hours) for each feed blower (calculated by the PLC)
- Blower discharge high temperature
- Blower discharge high pressure
- Blower VFD fault
- Blower motor high temperature
- No blower running alarm (loss of both run signals for more than 1 minute)
- HMI remote RESET signal to PLC
- Blower panel phase failure alarm
- Blower alternation time setpoint from HMI (Hour:Minute)
- Blower control panel intrusion alarm
- Blower control panel internal high temperature alarm
- Blower control panel UPS running on battery status
- Blower UPS fault

F. HMI Programming: Programming of the HMI software shall follow all formatting, documentation, conventions, data transfer, and signal conditioning standards utilized and established by the Owner for plant HMI iFIX programming.

G. Programming revisions required for the plant PLC network communications and HMI software as noted above shall be made such that functions and graphic displays match that supplied for similar existing devices and controls. Copies of existing process displays and control pop ups used at this facility are included at the end of this section. Revisions/Additions include:

1. Anoxic / Aeration & Reaeration No. 1 Process Display: Modified to link to new replacement blowers.

2. Replacement Blower Popup Displays: Modified to link to and provide control interface for the new replacement blowers.

3. Alarm Summary Display: Modified to add new blower alarms.

4. Run Hours Display: Modified to add runtime values for the blowers.

2.02 PRESSURE DIFFERENTIAL TRANSMITTER

A. Differential pressure transmitters shall be of the capacitance type with a process-isolated diaphragm with silicone oil fill, microprocessor-based "smart" electronics, and a field adjustable 30:1 input range. Span and zero shall be continuously adjustable externally over the entire range. Span and zero adjustments shall be capable of being disabled internally. Transmitters shall be NEMA 4X weatherproof and corrosion resistant construction with 316 stainless steel body, flanges, bolts, nuts and 316 stainless steel process wetted parts. Accuracy, including nonlinearity, hysteresis and repeatability errors shall be plus or minus 0.20 percent of calibrated span, zero based. The maximum zero elevation and maximum zero suppression shall be adjustable to anywhere within sensor limits. Output shall be linear isolated 4-20 milliamperes 24 VDC. Power supply shall be 24 VDC, two-wire design. Each transmitter shall be furnished with a 4-digit LCD indicator capable of displaying engineering units and/or milliamps and mounting hardware as required. Overload capacity shall be rated at a minimum of 25 MPa. Environmental limits shall be -40 to 85 degrees Celsius at 0-100% relative humidity. Each transmitter shall have a stainless steel tag with calibration data attached to body.

B. The capacitance pressure sensor shall be mechanically, electrically, and thermally isolated from the process and the environment, shall include an integral temperature compensation sensor, and shall provide a digital signal to the transmitter's electronics for further processing. Factory set correction coefficients shall be stored in the sensor's non-volatile memory for correction and linearization of the sensor output in the electronics section. The electronics section shall correct the digital signal from the sensor and convert it into a 4-20 mA analog signal for transmission to receiving devices. The electronics section shall contain configuration parameters and diagnostic data in non-volatile EEPROM memory and shall be capable of communicating, via HART protocol superimposed on the 4-20 mA output signal, with a remote interface device. Output signal damping shall be provided, with an adjustable time constant of 0-16 seconds.

C. Furnish close coupled Type 316 stainless steel three valve manifold assembly. Manifold assembly shall be HEX Products Model HM, or equal. Furnish Type 316 stainless steel 3/8" piping from the Venturi insert high and low taps to the three valve manifold with Type 316 stainless steel isolation ball valves at each Venturi insert tap connection. Furnish a rigid mounting stand for the DP transmitter fabricated from aluminum members with Type 316 stainless steel hardware to fasten the DP transmitter to the stand. Mount the DP transmitter with the display facing north.

D. The electronics sections of differential pressure transmitters shall contain user-selectable square root extractors to provide a linear 4-20 mA DC output proportional to flow, when activated. Furnish a pdf file with flow versus differential pressure curve. DP transmitter shall be calibrated to function as the flow indicating transmitter for the Venturi Insert flow meter supplied under this project.

E. Differential pressure indicating transmitters shall be Rosemount 3051, or approved equal.

2.03 VENTURI INSERT

A. GENERAL DESCRIPTION: Insert Type Venturi primary flow element shall be a high accuracy, high reliability differential flow measurement device that is thoroughly substantiated for 2 sigma performance. The hydraulic shape shall be ruggedly constructed on a properly sized center flange that fits within the bolt circle of the mating process piping that does not need to withstand the line pressure in the process piping resulting in an effective pressure rating of the element matching that of the process piping. The flow element shall be specifically designed to accurately measure the flow of air in the process pipe with minimum weight, permanent pressure loss and laying length and with maximum accuracy, repeatability, reliability and performance substantiation (to 2 sigma).

B. MATERIALS OF CONSTRUCTION: The entrance and exit cones shall be manufactured using Fiberglas reinforced polyester resin. The center flange shall be epoxy coated carbon steel and the meter throat section encompassing the beginning of the exit divergent angle as well as the end of the entrance convergent angle and entrance radius blend leading to the throat shall be fabricated from Type 304 stainless steel.

C. DESIGN: All materials shall be mill certified and of first quality manufactured to all applicable codes and standards. Meter shall have:
- Accuracy: +/- 0.50% of actual reading (2 Sigma)
- Range Ability: 4:1 based on a single range DP cell
- Line Size and Type: 8" ductile iron pipe
- Beta Ratio Capability: between 0.30 through 0.75
- Permanent Pressure Loss: less than 10% of differential
- Operating Conditions: process air, 0° F to 200° F
- Normal Operating Range: 200 to 800 scfm, ~8 psig

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PART 3 – EXECUTION

3.01 TESTING REQUIREMENTS

A. The CONTRACTOR shall provide the services of experienced factory trained technicians, tools and equipment to field calibrate, test, inspect, and adjust all equipment in accordance with manufacturer's specifications and instructions.

B. The proper control of all final control elements shall be verified by tests conducted in accordance with the requirements specified herein.

C. Prior to control system startup and testing, each monitoring and control loop shall be tested on an individual basis from the primary element to the final element, including the operator work station level, for continuity and for proper operation and calibration.

D. Control system startup and testing shall be performed to demonstrate complete compliance with all specified functional and operational requirements. Testing activities shall include the simulation of both normal and abnormal operating conditions.

E. Each loop and control strategy test shall be witnessed and signed off by the Contractor and the Engineer upon satisfactory completion.

F. Upon completion of the startup tests and prior to final system acceptance, the new controls shall be tested under normal operating conditions, initiated either automatically or manually, over a 30 day test period to demonstrate continuous reliable operation as intended.

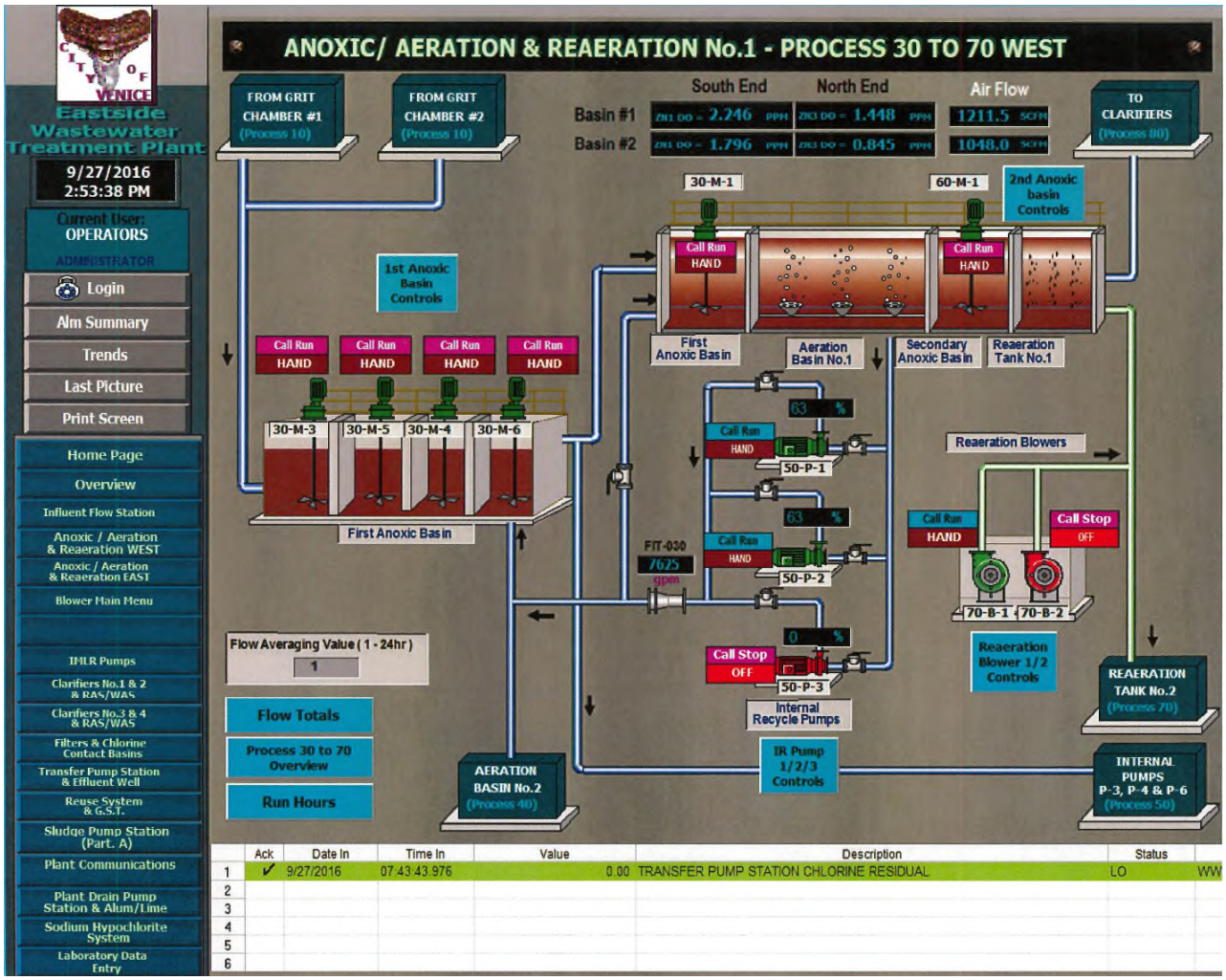
G. If the system fails the 30 day availability test, the 30 day test period shall be restarted after the failed component or software is repaired / replaced and full operation is restored.

3.02 FLOW METER INSTALLATION

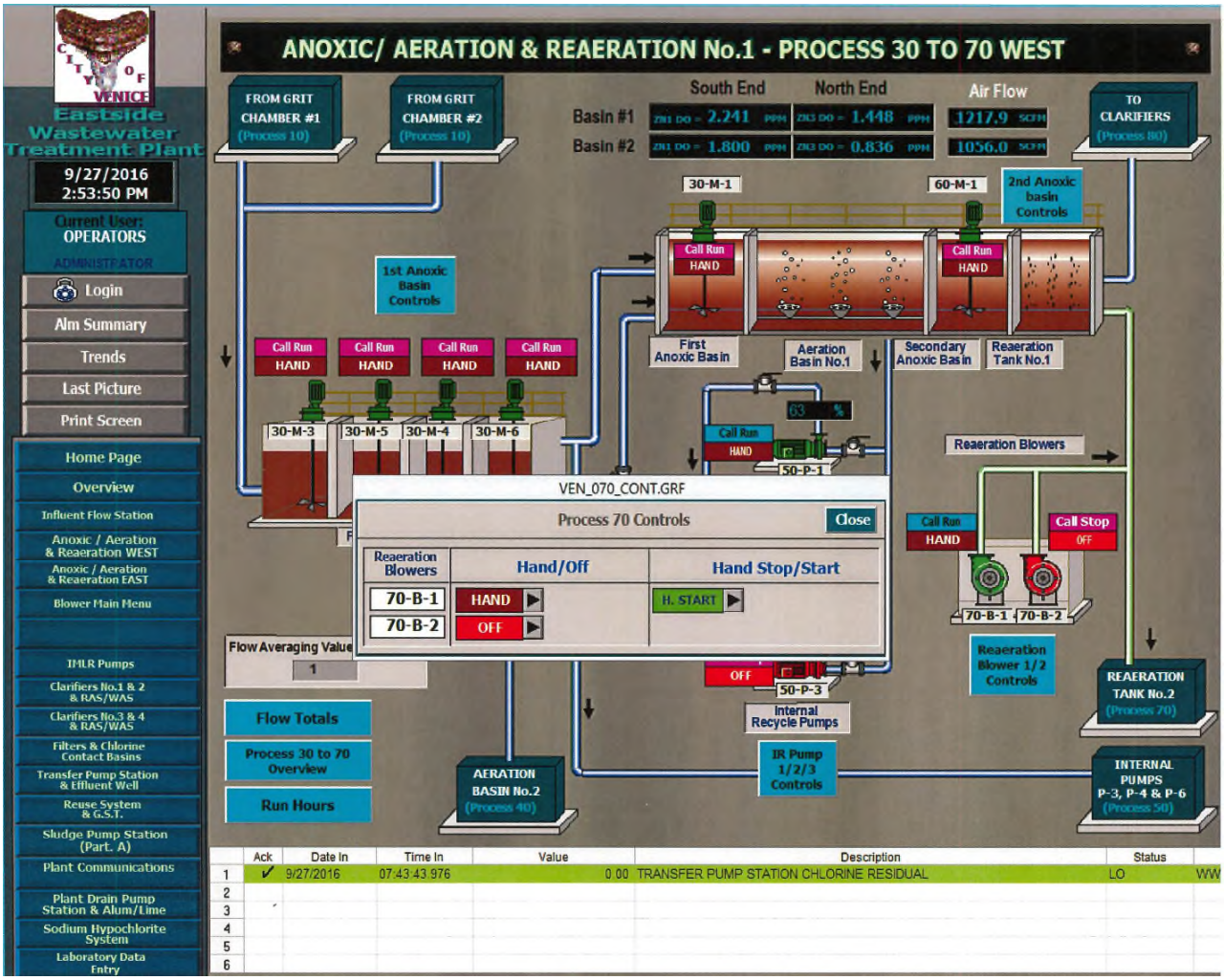
A. Contractor shall install the insert Venturi flow meter and associated DP transmitter in strict accordance with the manufacturer’s instructions and recommendation. Transmitter shall be mounted above the centerline of the insert Venturi with all sensor piping slope downward toward the insert to avoid condensation buildup within the sensor piping.

3.03 FINAL ACCEPTANCE

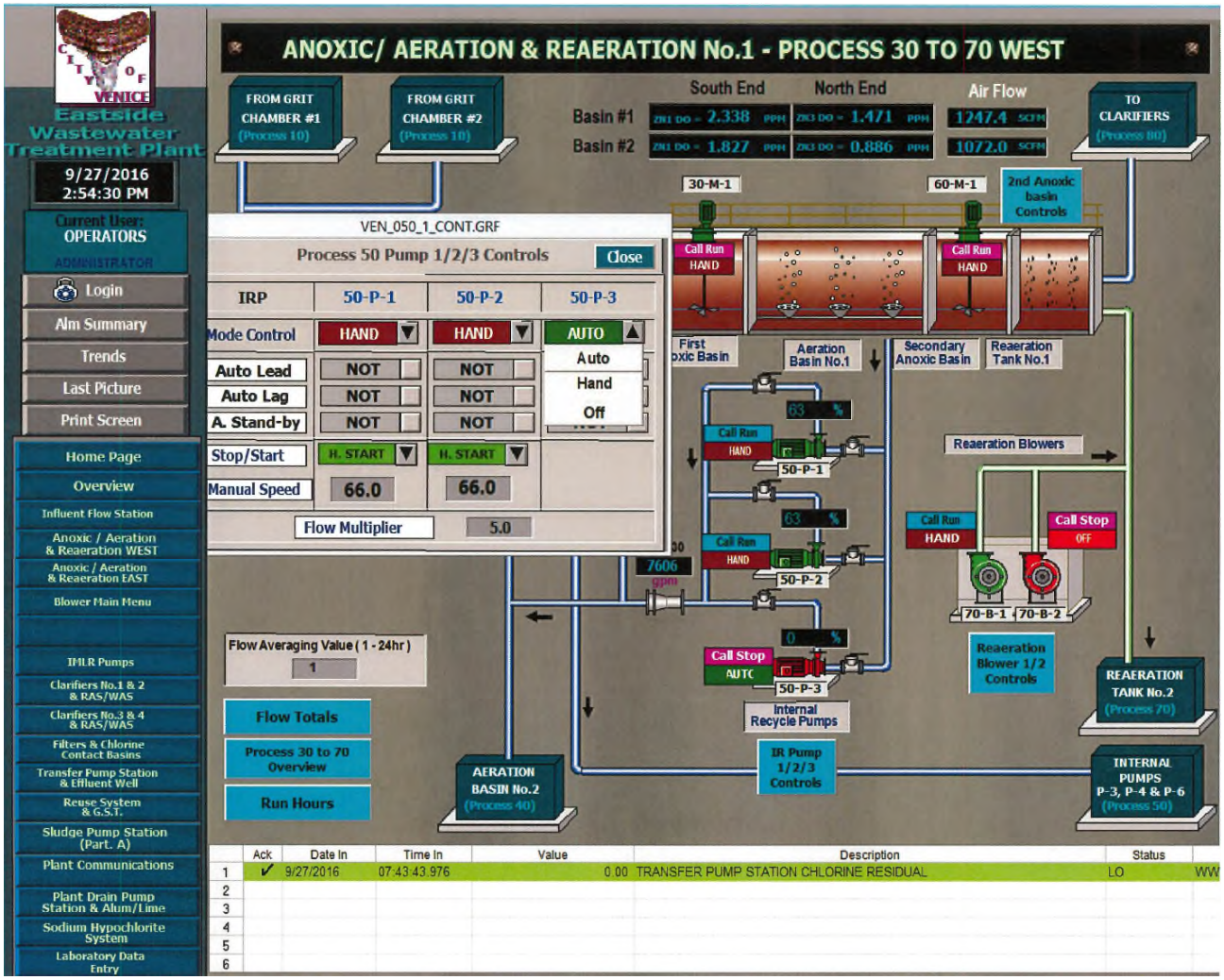
A. Final acceptance of the instrumentation programming will be determined complete by the Engineer, and shall be based successful completion of startup testing and training of the operations staff to the Owner’s satisfaction.



AERATION PROCESS DISPLAY



AERATION PROCESS DISPLAY WITH BLOWER CONTROL POPUP



AERATION PROCESS DISPLAY WITH BLOWER SETPOINT POPUP

- END OF SECTION -

CITY OF VENICE
EASTSIDE WATER RECLAMATION FACILITY
REAERATION BLOWER REPLACEMENT PROJECT

BID SUBMITTAL

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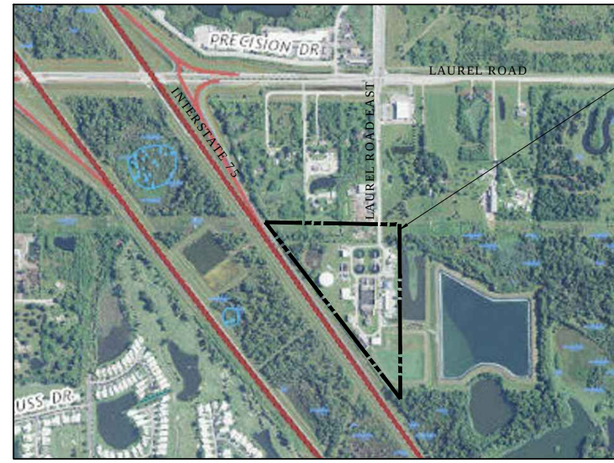


LOCATION MAP

NOT TO SCALE

FEBRUARY 2017

Hazen

HAZEN AND SAWYER
7334 DELAINEY COURT
SARASOTA, FLORIDA 34240
CERTIFICATE OF AUTHORIZATION NO. : 2771

HAZEN CONTRACT No. 41078-006

ABBREVIATIONS

AB	ANCHOR BOLT
AC	ALTERNATING CURRENT or ASBESTOS CEMENT
AD	AREA DRAIN
ADDL	ADDITIONAL
ADJ	ADJUSTABLE
AFF	ABOVE FINISHED FLOOR
AGGR	AGGREGATE
AL	ALUMINUM
ALLOW	ALLOWANCE/ALLOWABLE
ALT	ALTERNATE
APPROX	APPROXIMATE
ARCH	ARCHITECTURAL
ASPH	ASPHALT
B	BORING
BFE	BOTTOM OF FITTING ELEVATION
BFV	BUTTERFLY VALVE
BITUM	BITUMINOUS
℄	BASELINE
BLDG	BUILDING
BLK	BLOCK
BM	BENCH MARK
BOT	BOTTOM
BPV	BACK PRESSURE VALVE
BRG	BEARING
BRZ	BRONZE
BT	BOLT
BV	BALL VALVE
CAB	CABINET
CB	CATCH BASIN
C/C	CENTER TO CENTER
CEM	CEMENT
CF	CUBIC FEET
CFM	CUBIC FEET PER MINUTE
CIP	CAST IRON PIPE
CL	CENTER LINE
CL_2	CHLORINE
CLKG	CAULKING
CLR	CLEAR
CO	CLEANOUT
COL	COLUMN
CONC	CONCRETE
CONST	CONSTRUCTION
CONT	CONTINUOUS
CONTR	CONTRACTOR
CPVC	CHLORINATED POLYVINYL CHLORIDE
CRS	COURSE
CT	CERAMIC TILE
CTJ	CONTROL JOINT
CU	COPPER
CW	COLD WATER
CY	CUBIC YARD
DC	DIRECT CURRENT
DET	DETAIL
DIA	DIAMETER
DIAG	DIAGONAL
DIM	DIMENSION
DIP	DUCTILE IRON PIPE
DISCH	DISCHARGE
DIST	DISTRIBUTION
DN	DOWN
DWG	DRAWING
DWGS	DRAWINGS
DWL	DOWEL

E	EAST
EA	EACH
ECC	ECCENTRIC
EF	EACH FACE
EFF	EFFLUENT
EL OR ELEV	ELEVATION
ELEC	ELECTRIC/ELECTRICAL
ELL	ELBOW
ENGR	ENGINEER
ENT	ENTRANCE
EOG	EDGE OF GRAVEL
EOP	EDGE OF PAVEMENT
EQ	EQUAL
EQPT	EQUIPMENT
EX	EXISTING
EXC	EXCAVATE
EXH	EXHAUST
EXP	EXPANSION
EXT	EXTERIOR
FAB	FABRICATE
F&C	FRAME AND COVER
F&G	FRAME AND GRATE
FC	FLUSHING CONNECTION
FD	FLOOR DRAIN
FDN	FOUNDATION
FF	FINISH FLOOR
FIN	FINISH
FL	FLASHING/FLOOR
FLEX	FLEXIBLE
FLG	FLANGE
FLXC	FLEXIBLE CONNECTION
FM	FORCE MAIN
FRP	FIBERGLASS REINFORCED POLYESTER LAMINATE
FST	FINAL SETTLING TANK
FT	FEET
FTG	FOOTING/FITTING
G	GAS/GAS LINE
GA	GAUGE
GAL	GALLON
GALV	GALVANIZED
GEN	GENERATOR
GI	GALVANIZED IRON
GL	GLASS
GPM	GALLONS PER MINUTE
GR	GRADE
GV	GATE VALVE
GYP	GYPSUM
GSE	GROUND SURFACE ELEVATION
H	HEIGHT
HB	HOSE BIBB
HDW	HARDWARE
HORZ	HORIZONTAL
HP	HORSEPOWER
HPT	HIGH POINT
HVAC	HEATING,VENTILATION AND AIR CONDITIONING
HW	HOT WATER
HWL	HIGH WATER LEVEL
HYD	HYDRAULIC

I	IRON
ID	INSIDE DIAMETER
IF	INSIDE FACE
IN	INCH
INCL	INCLUDED
INF	INFLUENT
INS	INSULATION
INT	INTERIOR
INV	INVERT
JB	JUNCTION BOX
JCT	JUNCTION
JT	JOINT
L	LENGTH/ANGLE
LAT	LATERAL
LB	POUND
LF	LINEAR FEET
LG	LONG
LL	LIVE LOAD
LP	LIGHT POLE
LPT	LOW POINT
LR	LONG RADIUS
LT	LIGHT
LTG	LIGHTING
LWL	LOW WATER LEVEL
MAINT	MAINTENANCE
MANUF	MANUFACTURER
MATL	MATERIAL
MAX	MAXIMUM
MECH	MECHANICAL
MET	METAL
MFR	MANUFACTURER
MG	MILLION GALLONS
MGD	MILLION GALLONS PER DAY
MH	MANHOLE
MIN	MINIMUM
MISC	MISCELLANEOUS
MJ	MECHANICAL JOINT
MOD	MODIFY/MODIFIED
MON	MONUMENT
MOT	MOTOR
MTD	MOUNTED
MTG	MOUNTING
MULT	MULTIPLE
N	NORTH
NA	NOT APPLICABLE
NF	NEAR FACE
NGS	NATURAL GAS
NIC	NOT IN CONTRACT
NO	NUMBER
NOM	NOMINAL
NPW	NON POTABLE WATER
NTS	NOT TO SCALE
OC	ON CENTER
OD	OUTSIDE DIAMETER
OF	OUTSIDE FACE
OFF	OFFICE
OPER	OPERATOR
OPNG	OPENING
OPP	OPPOSITE
ORIG	ORIGINAL
OVHD	OVERHEAD

PAR	PARALLEL
PCF	POUNDS PER CUBIC FOOT
PCV	PRESSURE CONTROL VALVE
PE LINING	POLYETHYLENE LINING
PERF	PERFORATED
PERP	PERPENDICULAR
PI	POINT OF INTERSECTION
ℙ	PROPERTY LINE/PLATE
PNL	PANEL
PP	POWER POLE
PREFAB	PREFABRICATED
PRV	PRESSURE RELIEF VALVE
PS	PUMPING STATION
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PV	PLUG VALVE
PVC	POLYVINYL CHLORIDE
PVMT	PAVEMENT
PW	POTABLE WATER
QTY	QUANTITY
RAS	RETURN ACTIVATED SLUDGE
R	RADIUS/RISER
RCP	REINFORCED CONCRETE PIPE
RD	ROAD/ROOF DRAIN
RECIR	RECIRCULATION
RECP	RECEPTACLE
RECT	RECTANGULAR
RED	REDUCER
REF	REFERENCE
REG	REGISTER
REINF	REINFORCING
REM	REMOVE
REQD	REQUIRED
REST	RESTRAINED
REV	REVISE
RJ	RESTRAINED JOINT
RND	ROUND
RPM	REVOLUTIONS PER MINUTE
RT	RIGHT
RTU	REMOTE TERMINAL UNIT
R/W	RIGHT OF WAY
S	SOUTH/SLOPE
SAN	SANITARY
SBL	SURVEY BASELINE
SCH	SCHEDULE
SD	STORM/SITE DRAIN
SECT	SECTION
SERV	SERVICE
SEW	SEWER
SF	SQUARE FEET
SHT	SHEET
SI	SQUARE INCH
SIM	SIMILAR
SPEC	SPECIFICATION
SQ	SQUARE
SS	SANITARY SEWER
SST	STAINLESS STEEL
STA	STATION
STD	STANDARD
STG	STORAGE
STL	STEEL
STRU	STRUCTURAL
SUB	SUBSTITUTE
SUCT	SUCTION
SUP	SUPPLY
SUR	SURFACE
SUSP	SUSPENDED
SW	SWITCH
SWBD	SWITCHBOARD
SYM	SYMMETRICAL

T	TREAD
T&B	TOP AND BOTTOM
T&G	TONGUE AND GROOVE
TAN	TANGENT
TBM	TEMPORARY BENCH MARK
TC	TOP OF CURB
TDH	TOTAL DYNAMIC HEAD
TECH	TECHNICAL
TEMP	TEMPERATURE
THERMO	THERMOSTAT
THK	THICK
THRU	THROUGH
TOD	TOP OF DECK
TOF	TOP OF FOOTING
TOM	TOP OF MASONRY/MANHOLE
TOS	TOP OF SLAB
TOW	TOP OF WALL
TOL	TOLERANCE
TPS	TWISTED PAIR SHIELDED
TRANS	TRANSFORMER
TYP	TYPICAL
UG	UNDERGROUND
UH	UNIT HEATER
UNFIN	UNFINISHED
UNK	UNKNOWN
UNO	UNLESS NOTED OTHERWISE
UTIL	UTILITY
VAC	VACUUM
VEL	VELOCITY
VENT	VENTILATING/VENTILATION
VERT	VERTICAL
VOL	VOLUME
WAS	WASTE ACTIVATED SLUDGE
W	WEST/WIDTH
W/	WITH
WF	WIDE FLANGE
WL	WATER LEVEL
W/L	WATER LINE
W/O	WITHOUT
WP	WATERPROOF
WPFG	WATER PROOFING
WS	WATERSTOP
WSE	WATER SURFACE ELEVATION
WSP	WEATHERSTRIP
WT	WEIGHT
W/T	WATERTIGHT
WV	WATER VALVE
WWF	WELDED WIRE FABRIC
YD	YARD
YR	YEAR

PROCESS PIPE DESIGNATIONS

AL	ALUM
GS	GRAVITY SEWER
DR	DRAIN(AGE)
PW	POTABLE WATER
RA	REAERATION AIR
RW	RECLAIMED WATER
SA	SAMPLE LINE
S02	SULFUR DIOXIDE

LINETYPES

- PROPOSED ITEMS
- EXISTING ITEMS
- HIDDEN ITEMS
- CONSTRUCTION LIMITS
- PROPOSED INDEX CONTOURS
- PROPOSED INTERMEDIATE CONTOURS
- EXISTING INDEX CONTOURS
- EXISTING INTERMEDIATE CONTOURS
- PROPOSED SILT FENCE
- PROPOSED STONE FILTER
- PROPOSED TEMPORARY SEDIMENT BASIN
- PROPOSED TEMPORARY DIVERSION SWALE
- PROPOSED CURB INLET SEDIMENT CONTROL
- NEW PAVEMENT/STRUCTURE
- EXISTING PAVEMENT TO BE RESURFACED
- DEMOLITION ITEMS
- GROUT IN PLACE
- CENTER LINE
- MATCH LINE

LEGEND

MATERIALS

- GRADE OR EARTH
- ASPHALT PAVING
- SAND
- GRAVEL
- CONCRETE
- CONC. FILL OR GROUT
- CONC. MASONRY UNIT
- BRICK
- CAP AND GROUT PIPING
- ROCK
- STEEL
- INSULATION
- WATER SURFACE
- GRATING
- CHECKERED PLATE
- GLASS
- WOOD BLOCKING
- DEMOLISH PIPING

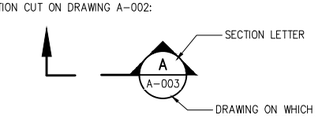
SYMBOLS

- GATE VALVE
- BUTTERFLY VALVE
- PLUG VALVE
- SWING CHECK VALVE
- GLOBE VALVE
- PINCH VALVE
- DIAPHRAGM VALVE
- BALL VALVE
- BALL CHECK VALVE
- HARNESSED FLANGED ADAPTER
- HARNESSED SLEEVE TYPE COUPLING
- SLEEVE TYPE COUPLING
- HARNESSED FLEXIBLE COUPLING
- WALL PENETRATION
- MECHANICAL COUPLING
- WELDED JOINT
- FLANGED JOINT
- MECHANICAL, PUSH ON OR RESTRAINED JOINT
- SLUICE GATE
- SLIDE GATE/STOP GATE
- FLUSHING CONNECTION
- HOSE BIBB
- QUICK DISCONNECT FITTING
- YARD HYDRANT
- FIRE HYDRANT
- SOIL BORING
- CAM LOCK FITTING

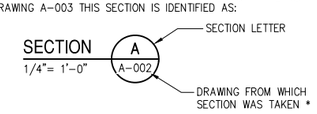
SECTION AND DETAIL KEYING

DRAWINGS ARE CROSS REFERENCED IN THE FOLLOWING METHOD:

(1) SECTION CUT ON DRAWING A-002:



(2) ON DRAWING A-003 THIS SECTION IS IDENTIFIED AS:



DETAILS ARE CROSS REFERENCED IN A SIMILAR MANNER, EXCEPT DETAILS ARE IDENTIFIED BY A SQUARE WITH A NUMBER IN THE UPPER HALF.

STANDARD DETAILS ARE REFERENCED BY A UNIQUE SEVEN DIGIT NUMBER AND ARE SHOWN ON THE CONTRACT DRAWINGS BY ONE OF TWO METHODS:

1509203 — REFERENCED ITEM

OR:

SEE 1509203 — REFERENCED ITEM

STANDARD DETAILS ARE COMPILED IN APPROXIMATE NUMERICAL ORDER IN THE BACK OF THE CONTRACT DRAWINGS ON THE D* DRAWINGS.

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER:	A. COLEMAN
DESIGNED BY:	RDM
DRAWN BY:	ESM
CHECKED BY:	AJC

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE — 0 1/2" 1"

Name: Date:
Florida Professional Engineer's Registration Number:

Hazen
HAZEN AND SAWYER
7334 DELAINEY COURT
SARASOTA, FLORIDA 34240

CITY OF VENICE, FLORIDA

EASTSIDE WATER RECLAMATION FACILITY
REAERATION BLOWER REPLACEMENT PROJECT

GENERAL
ABBREVIATIONS, LEGEND, PIPE DESIGNATIONS

DATE:	FEBRUARY 2017
HAZEN NO.:	41078-006
CONTRACT NO.:	
DRAWING NUMBER:	G02

PLOT DATE: 2017/02/13 11:16:08 AM BY: MCALZON
File: H:\41078-006 EASTSIDE WRF BLOWER REPLACEMENT\DRAWINGS\GENERAL\G02 Saved By MCALZON Save Date: 2016/12/20 3:41 PM

GENERAL SITE NOTES

1. THE CONTRACTOR SHALL PERFORM ALL CONSTRUCTION IN ACCORDANCE WITH THE LINES AND GRADES SHOWN ON THE PLANS AND TO TOLERANCES STATED HEREIN OR IN THE SPECIFICATIONS. REFER TO SITE PLAN(S) FOR HORIZONTAL DIMENSIONS AND CONTROL FOR BUILDINGS.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL HORIZONTAL AND VERTICAL CONTROL MARKERS AND PROPERTY CORNERS (MONUMENTS, PIPES, ETC.) FOR THE DURATION OF CONSTRUCTION. MARKERS SHALL BE CONTINUOUSLY FLAGGED AND SHALL BE RESET IMMEDIATELY BY A FLORIDA LICENSED LAND SURVEYOR IF ANY SHOULD BECOME DISTURBED.
3. LOCATIONS, ELEVATIONS AND DIMENSIONS OF EXISTING UTILITIES, STRUCTURES AND OTHER FEATURES ARE SHOWN ACCORDING TO THE BEST INFORMATION AVAILABLE AT THE TIME OF THE PREPARATION OF THESE DRAWINGS. THE CONTRACTOR SHALL VERIFY THE LOCATIONS, ELEVATIONS AND DIMENSIONS OF ALL EXISTING UTILITIES, STRUCTURES, ETC. AFFECTING THE WORK PRIOR TO SUBMITTAL OF SHOP DRAWINGS AND ORDERING MATERIALS.
4. IF UTILITY FIELD LOCATIONS ARE REQUIRED, THE CONTRACTOR SHALL COORDINATE HIS CONSTRUCTION SCHEDULE WITH ALL UTILITY COMPANIES BY PROVIDING A MINIMUM OF 48 HOURS NOTICE OF WHEN CONSTRUCTION WILL COMMENCE IN AN AREA IN ORDER TO PERMIT FIELD LOCATION OF UTILITY LINES PRIOR TO CONSTRUCTION. A TOLL FREE NUMBER, 1-800-432-4770 IS AVAILABLE TO ASSIST IN SUCH COORDINATION EFFORTS. THIS NUMBER IS PART OF THE UTILITY NOTIFICATION PROGRAM PROVIDED BY SUNSHINE STATE ONE-CALL OF FLORIDA, INC., BUT DOES NOT NECESSARILY REPRESENT ALL UTILITY COMPANIES IN THE AREA.
5. ALL UTILITIES SHALL BE KEPT IN OPERATION EXCEPT WITH THE EXPRESS WRITTEN CONSENT OF THE OWNER. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PRESERVE EXISTING UTILITIES AND ANY AND ALL DAMAGE TO EXISTING UTILITIES AS A RESULT OF THE CONTRACTOR'S ACTIONS SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.
6. THE CONTRACTOR SHALL REPLACE ALL PAVING, STABILIZED EARTH, DRIVEWAYS, SIDEWALKS, RETAINING WALLS, ETC. TEMPORARILY REMOVED OR DAMAGED DURING CONSTRUCTION WITH THE SAME MATERIAL REMOVED OR DAMAGED OR AS DIRECTED BY THE ENGINEER.
7. THE CONTRACTOR SHALL CONTACT THE ENGINEER PRIOR TO PROCEEDING WITH ANY SITE WORK WITH WHICH A CONFLICT HAS ARISEN DURING CONSTRUCTION OF ANY IMPROVEMENTS SHOWN ON THESE DRAWINGS.
8. ALL FUGITIVE DUST SHALL BE CONTROLLED ON SITE. WATERING, APPLICATION OF CALCIUM CHLORIDE OR OTHER PRIOR APPROVED MEANS OF DUST CONTROL SHALL BE EMPLOYED TO PREVENT THE EMANATION OF DUST FROM THE SITE. PERMANENT GRASSING, LANDSCAPING AND OTHER SITE WORK SHALL BE INCORPORATED AS SOON AS POSSIBLE.
9. CONSTRUCTION SHALL BE CARRIED OUT "IN THE DRY". THE CONTRACTOR SHALL REVIEW SITE CONDITIONS AND DETERMINE METHODS AND EXTENT OF DEWATERING NECESSARY AND SHALL INCLUDE COSTS OF DEWATERING IN THE BID. NO ADDITIONAL COMPENSATION SHALL BE PROVIDED FOR CONTROL OF GROUND OR SURFACE WATER OR FOR ADDITIONAL MATERIALS OR REWORK REQUIRED AS A RESULT OF INADEQUATE OR INSUFFICIENT DEWATERING.
10. ALL WORK TO BE PERFORMED FOR THE COMPLETION OF THIS PROJECT SHALL BE CONSTRUCTED ACCORDING TO THE BEST PRACTICES OF THE INDUSTRY AND IN ACCORDANCE WITH APPLICABLE FEDERAL, STATE, CITY CODES, ORDINANCES, STANDARDS AND PERMIT CONDITIONS.
11. CONTRACTOR AND ALL PERSONNEL ASSOCIATED WITH THE CONTRACTOR SHALL SIGN IN/OUT AT THE CITY'S ADMIN BUILDING AT THE BEGINNING OF THE PROJECT.
12. CONTRACTOR SHALL COORDINATE WITH OTHER WORK THAT IS BEING PERFORMED AT THE SITE. CONTRACTOR SHALL NOTIFY THE OWNER OF UPCOMING DELIVERIES, HOWEVER, THE OWNER IS NOT RESPONSIBLE AND WILL NOT ACCEPT CONTRACTOR DELIVERIES.
13. CONTRACTOR SHALL COORDINATE WITH OWNER ON SITE ACCESS, PARKING AREAS, AND MATERIAL/EQUIPMENT LAYDOWN AREAS.

PIPE INSTALLATION GENERAL NOTES

1. THE CONTRACTOR SHALL MAINTAIN COPIES OF ALL APPLICABLE PERMITS ON-SITE AND SHALL BE RESPONSIBLE TO ADHERE TO ALL PERMIT CONDITIONS DURING CONSTRUCTION.
2. ALL UNDERGROUND UTILITIES WITHIN PAVEMENT MUST BE INSTALLED BEFORE ROADWAY BASE AND SUBSURFACE COURSES ARE CONSTRUCTED.
3. ALL PIPE LENGTHS ARE PLUS OR MINUS AND ARE MEASURED FROM CENTER OF FITTINGS UNLESS NOTED OTHERWISE.
4. PRIOR TO SUBMITTALS OF SHOP DRAWINGS AND ORDERING MATERIALS FOR BELOW GROUND PIPE WORK, POTENTIAL CONFLICTS SHALL BE IDENTIFIED AND LOCATED BY THE CONTRACTOR. PIPELINES SHALL BE LAID LEVEL, WITHOUT THE USE OF FITTINGS TO AVOID EXISTING UTILITIES. THE FINAL ALIGNMENT OF ALL PIPELINES SHALL BE AS AGREED BY THE ENGINEER.

PAVING, DRAINAGE AND GRADING NOTES

1. ALL PAVING, GRADING AND DRAINAGE SYSTEM CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CITY OF VENICE CONSTRUCTION STANDARDS, LATEST EDITION, AND THE "STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD AND BRIDGE CONSTRUCTION STANDARDS", LATEST EDITION.
2. ALL PAVEMENT REMOVAL SHALL BE ACCOMPLISHED BY SAW CUTTING EXISTING PAVEMENT.
3. PAVEMENT AND GRADING SHALL BE SLOPED TO THE PROPOSED ELEVATIONS AND CONTOURS SHOWN ON THE DRAWINGS. SMOOTH, CONSTANT SLOPES SHALL BE MAINTAINED BETWEEN PROPOSED ELEVATIONS AND CONTOURS. PROPOSED CONTOUR ELEVATIONS, SPOT ELEVATIONS AND FINISHED GRADE ELEVATIONS IN NON-PAVED AREAS REFER TO FINISHED SURFACE ELEVATIONS ONCE SODDING OR SEEDING IS COMPLETE.
4. SOD ALL DISTURBED AREAS TO MATCH EXISTING.
5. SOD SHALL BE FLORIDA STANDARD GRADE, A MINIMUM AGE OF 18 MONTHS, WITH ROOT DEVELOPMENT THAT WILL SUPPORT ITS OWN WEIGHT WITHOUT TEARING WHEN SUSPENDED VERTICALLY BY HOLDING UP THE UPPER TWO CORNERS. SOD PADS SHALL BE 18 BY 24 INCHES +/- 5% AND 1" OF SOIL ON THE ROOTS. SOD SHALL BE UNIFORM IN GREEN COLOR, LEAF TEXTURE AND DENSITY. BROWN OR YELLOW SOD SHALL NOT BE ACCEPTED.
6. A COMPLETE FERTILIZER SHALL BE APPLIED TO THE SOIL AT A RATE OF ONE (1) POUND OF NITROGEN PER 1000 SQUARE FEET. THOROUGHLY WORK FERTILIZER INTO THE TOP 4 INCHES OF SOIL PRIOR TO FINE GRADING AND SODDING. DO NOT LAY SOD DIRECTLY ON FERTILIZER WITHOUT TILLING INTO THE SOIL. THE FERTILIZER MUST BE THOROUGHLY MIXED INTO THE SOIL.

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER:	A. COLEMAN
DESIGNED BY:	RDM
DRAWN BY:	ESM
CHECKED BY:	AJC
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE	0 1/2" 1"

Name: Date:
Florida Professional Engineer's Registration Number:

Hazen

HAZEN AND SAWYER
7334 DELAINEY COURT
SARASOTA, FLORIDA 34240

CITY OF VENICE, FLORIDA

EASTSIDE WATER RECLAMATION FACILITY
REAERATION BLOWER REPLACEMENT PROJECT

GENERAL NOTES

DATE:	FEBRUARY 2017
HAZEN NO.:	41078-006
CONTRACT NO.:	
DRAWING NUMBER:	G03

EROSION CONTROL NOTES:

1. ALL PRACTICABLE AND NECESSARY EFFORT SHALL BE TAKEN DURING CONSTRUCTION TO CONTROL AND PREVENT EROSION AND TRANSPORT OF SEDIMENT MATERIAL TO INLETS, SURFACE DRAINS, DITCHES, WETLANDS AND DETENTION AREAS. CONTRACTOR SHALL FOLLOW FDOT GUIDELINES FOR THE INSTALLATION AND MAINTENANCE OF TEMPORARY EROSION AND SEDIMENT CONTROL DEVICES AND REFERENCE FDOT INDEX NOS. 102 AND 103.

2. ALL TEMPORARY EROSION AND SEDIMENT CONTROL DEVICES SHALL BE INSTALLED BEFORE CONSTRUCTION BEGINS AND REMAIN IN PLACE UNTIL PERMANENT COUNTERMEASURES ARE INSTALLED OR PERMANENT GROUND COVER IS ESTABLISHED.

3. STAKED HAY BALES AND SILT FENCING SHALL BE PLACED ADJACENT TO DITCHES TO PREVENT TURBID DISCHARGES FROM CONSTRUCTION ACTIVITIES.

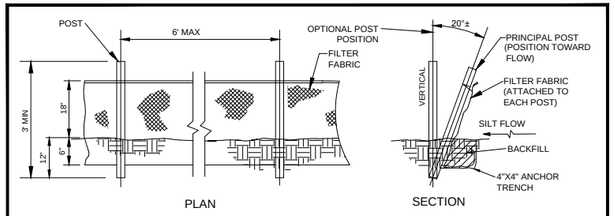
4. STAKED SILT FENCE SHALL BE PLACED ALONG THE EDGES OF CONSTRUCTION TO PREVENT TURBID DISCHARGES FROM FLOWING ONTO ADJACENT PROPERTIES. THIS FENCING SHALL EXTEND THE LENGTH OF THE PROPOSED IMPROVEMENTS FOR THE DURATION OF CONSTRUCTION.

5. ALL EROSION AND SILT CONTROL METHODS AND LOCATIONS INDICATED ON THE DRAWINGS ARE FOR STARTUP AND GENERAL REFERENCE AND SHALL BE ADJUSTED, AS REQUIRED, TO SUIT THE PROCESS OF THE CONSTRUCTION.

6. THE CONTRACTOR SHALL PROVIDE SILTATION REDUCTION DEVICES FOR THE DISCHARGE FROM ANY DEWATERING PROCESS SO THAT DIRECT DISCHARGE DOES NOT OCCUR.

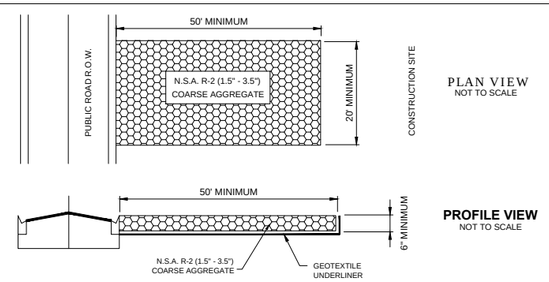
7. THE CONTRACTOR SHALL CHECK ALL EROSION AND SILTATION CONTROL DEVICES AFTER EACH RAINFALL AND REPAIR OR REPLACE THEM AS REQUIRED AT CONTRACTOR'S EXPENSE.

8. THE CONTRACTOR SHALL PROVIDE TO CMSI ON A WEEKLY BASIS, A COMPLETED STORMWATER POLLUTION PREVENTION PLAN INSPECTION REPORT, A COPY WHICH IS TO BE KEPT WITH THE CONTRACTORS EROSION CONTROL PLAN AND PRESENTED UPON REQUEST TO THE PROPER AUTHORITIES.



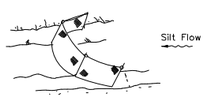
1.) POSTS SHALL BE WOOD (2"X4" OR 2 1/2" DIA.) OR STEEL (MIN. 1.33 LBS/FT.).
2.) SILT FENCE SHALL BE PLACED PRIOR TO ANY EARTHMOVING, EXCAVATION OR VEGETATION REMOVAL.
3.) CONTRACTOR IS RESPONSIBLE FOR MONITORING & MAINTAINING THE SILT FENCE IN GOOD CONDITION THROUGHOUT THE LIFE OF THE PROJECT.
4.) THE CITY ENGINEER OR HIS DESIGNEE MAY ISSUE A STOP WORK ORDER IN THE EVENT THAT SILT FENCE IS NOT BEING MAINTAINED OR IF SEDIMENT IS MIGRATING OFF-SITE.

SILT FENCE DETAIL
N.T.S.



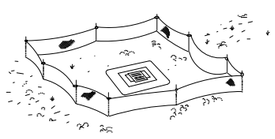
CRUSHED STONE CONSTRUCTION EXIT DETAIL
N.T.S.

	CITY OF VENICE ENGINEERING DEPARTMENT 401 WEST VENICE AVE. VENICE FL 34285 (941) 486-2626 FAX (941) 480-3031	ENGINEERING SILT FENCE & CONSTRUCTION EXIT	DATE JAN. 2016 SHEET NO. ENG-7



Note: Spacing for Type III Fence to be in accordance with Chart I, Sheet 1 of 3 and ditch installations at drainage structures Sheet 2 of 3.

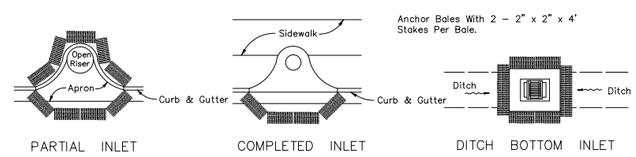
Type III Silt Fence



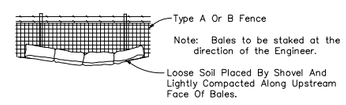
Type III Silt Fence Protection Around Ditch Bottom Inlets.

Do not deploy in a manner that silt fences will act as a dam across permanent flowing watercourses. Silt fences are to be used at upland locations and turbidity barriers used at permanent bodies of water.

SILT FENCE APPLICATIONS



PROTECTION AROUND INLETS OR SIMILAR STRUCTURES



BALES BACKED BY FENCE

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER:	A. COLEMAN
DESIGNED BY:	RDM
DRAWN BY:	ESM
CHECKED BY:	AJC
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE	0 1/2" 1"

Name: Date:
Florida Professional Engineer's Registration Number:

Hazen

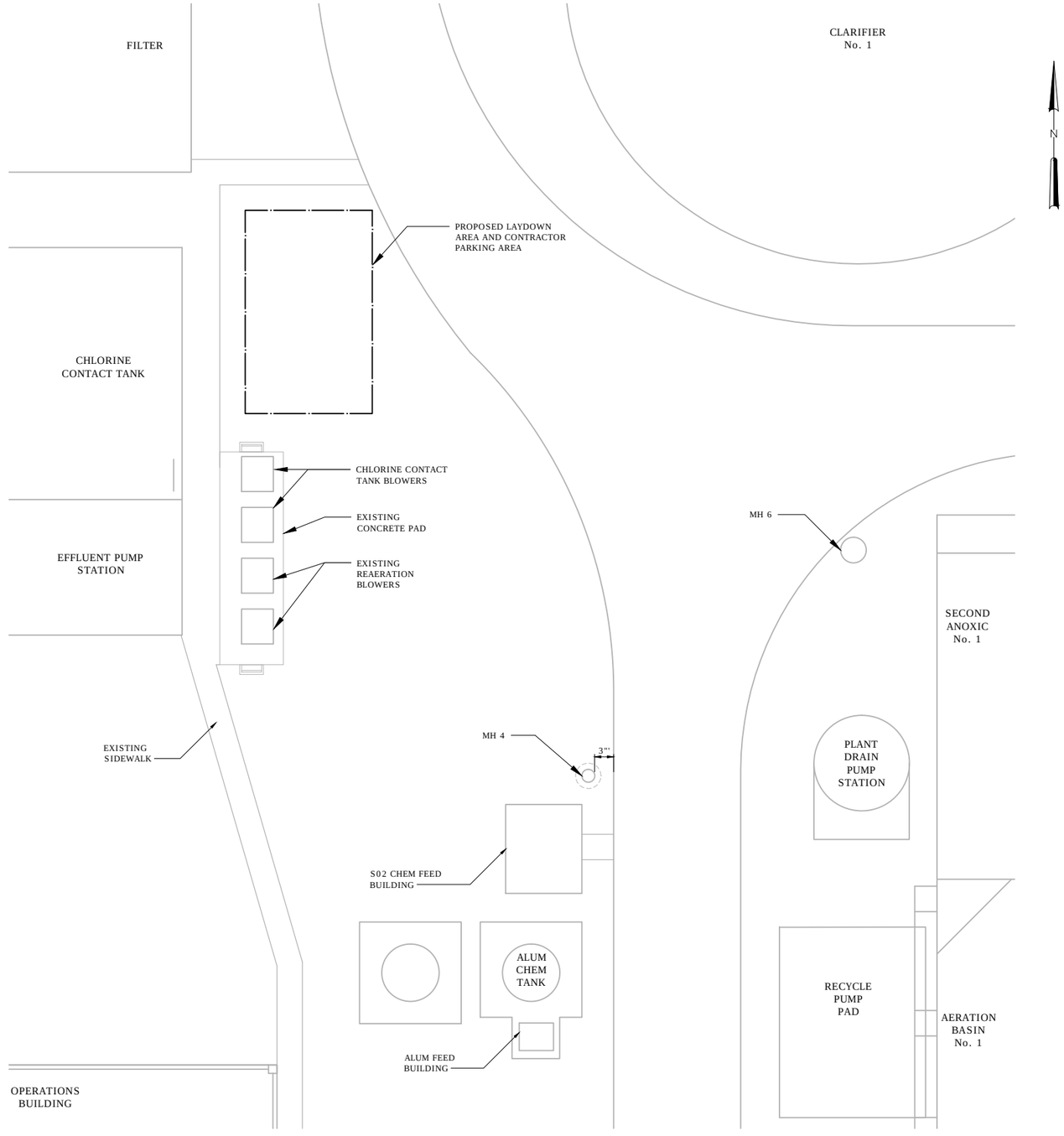
HAZEN AND SAWYER
7334 DELAINEY COURT
SARASOTA, FLORIDA 34240

CITY OF VENICE, FLORIDA

EASTSIDE WATER RECLAMATION FACILITY
REAERATION BLOWER REPLACEMENT PROJECT

CIVIL
SEDIMENTATION AND
EROSION CONTROL

DATE:	FEBRUARY 2017
HAZEN NO.:	41078-006
CONTRACT NO.:	
DRAWING NUMBER:	C01



SITE PLAN
1" = 10'

1" = 10'-0" 10 5 0 10'

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER:	A. COLEMAN
DESIGNED BY:	RDM
DRAWN BY:	ESM
CHECKED BY:	AJC
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE	0 1/2" 1"

Name: Date:
Florida Professional Engineer's Registration Number:

Hazen

HAZEN AND SAWYER
7334 DELAINEY COURT
SARASOTA, FLORIDA 34240

CITY OF VENICE, FLORIDA

EASTSIDE WATER RECLAMATION FACILITY
REAERATION BLOWER REPLACEMENT PROJECT

CIVIL
EXISTING SITE PLAN

DATE:	FEBRUARY 2017
HAZEN NO.:	41078-006
CONTRACT NO.:	
DRAWING NUMBER:	C02

PLOT DATE: 2017/02/13 11:15:54 AM BY: MCALZON
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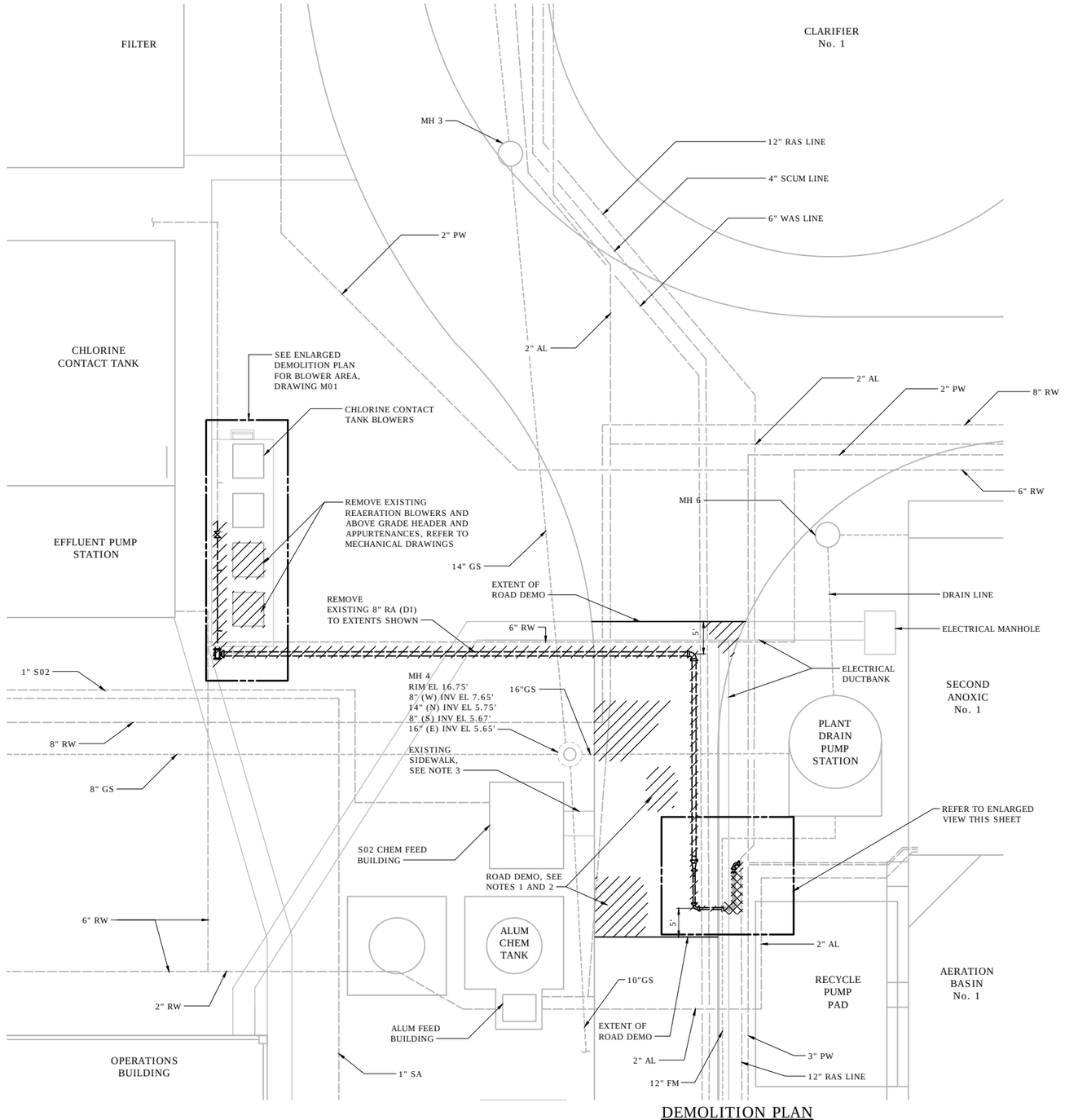
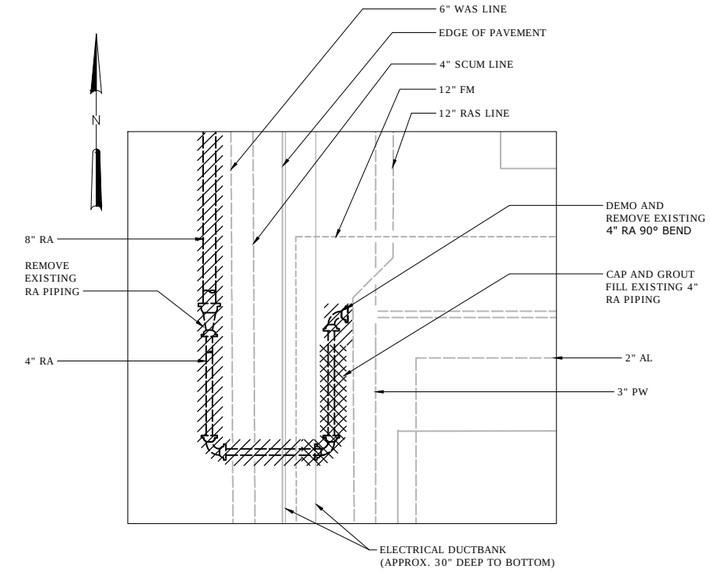


DEMOLITION PLAN
1"=10'



ENLARGED VIEW
1"=4'-0"

NOTES:

1. SAWCUT AND MILL EXISTING ASPHALT PER DETAIL ON SHEET C05. PROVIDE ADDITIONAL ROAD DEMO, WHERE EXISTING RA PIPE IS REMOVED, AS REQUIRED FOR REMOVAL OF THE PIPE.
2. OWNER SHALL BE PROVIDED CONTINUOUS USE OF THE ACCESS ROAD DURING CONSTRUCTION.
3. CONTRACTOR SHALL REMOVE SIDEWALK AS REQUIRED TO INSTALL RA PIPING. SIDEWALK SHALL BE REPLACED TO MATCH EXISTING PER DETAIL ON SHEET C05.

1"=10'-0" 10 5 0 10'

1"=4'-0" 4 2 0 4'

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER:	A. COLEMAN
DESIGNED BY:	RDM
DRAWN BY:	ESM
CHECKED BY:	AJC
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE	0 1/2" 1"

Name: Date:
Florida Professional Engineer's Registration Number:

Hazen

HAZEN AND SAWYER
7334 DELAINEY COURT
SARASOTA, FLORIDA 34240

CITY OF VENICE, FLORIDA

EASTSIDE WATER RECLAMATION FACILITY
REAERATION BLOWER REPLACEMENT PROJECT

CIVIL
DEMOLITION PLAN

DATE: FEBRUARY 2017
HAZEN NO.: 41078-006
CONTRACT NO.:
DRAWING NUMBER: C03

PLOT DATE: 2017/02/13 11:15:34 AM BY: MCALZON
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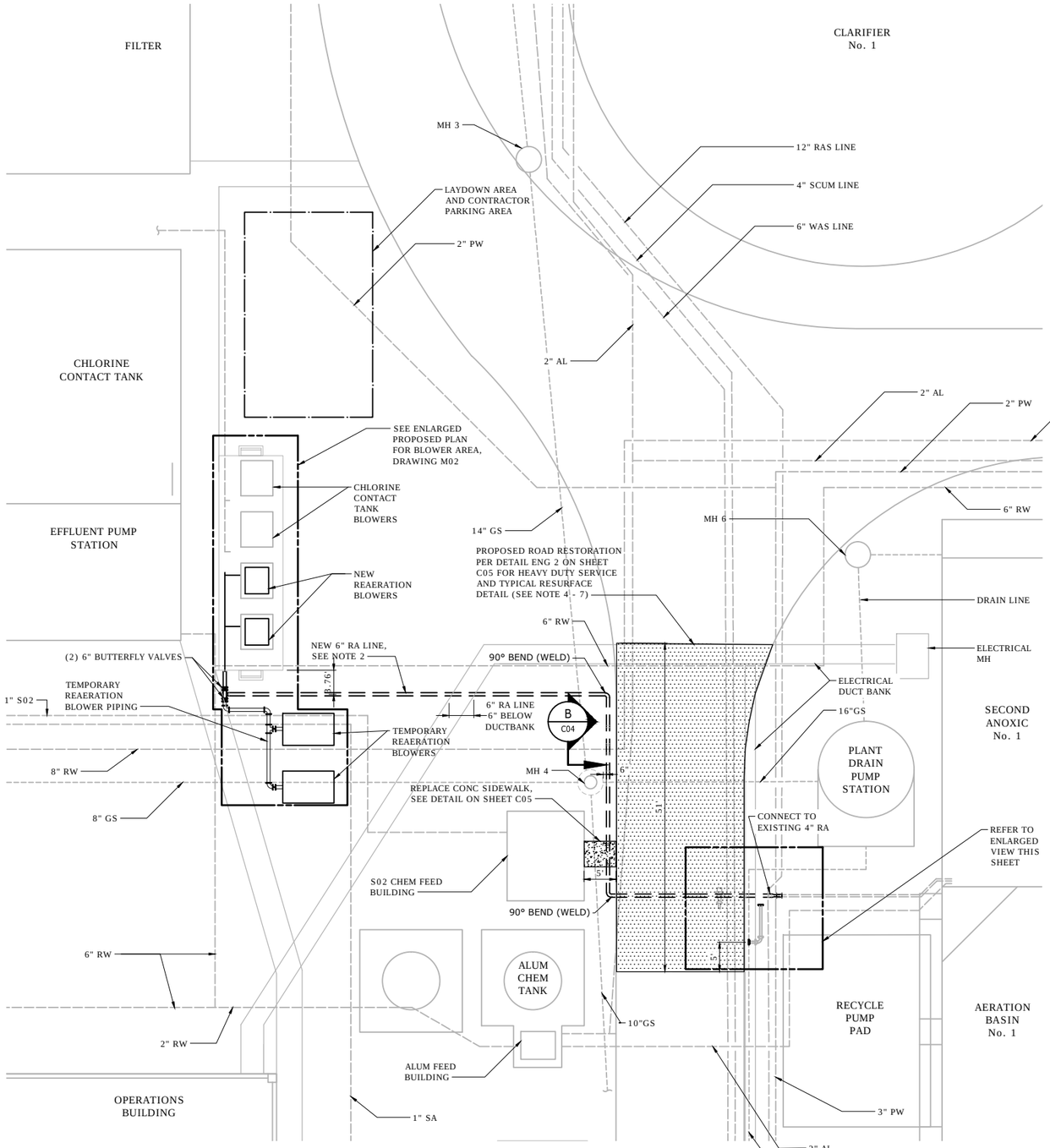
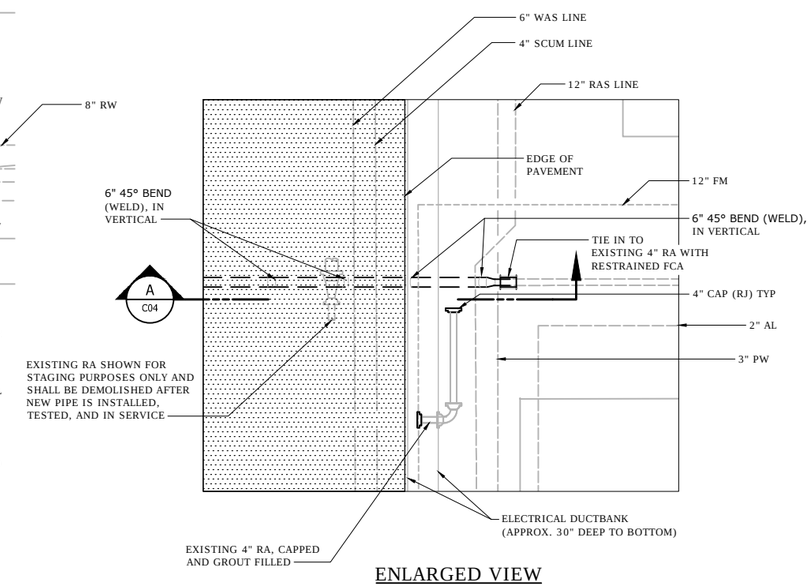
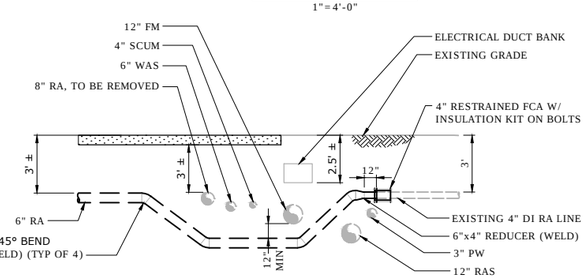


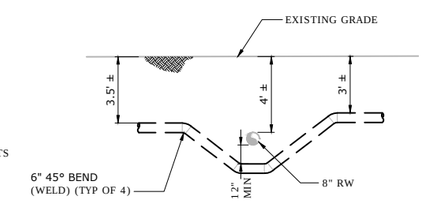
YARD PIPING PLAN
1"=10'



ENLARGED VIEW
1"=4'-0"



SECTION A C04
1" = 4'-0"



SECTION B C04
1" = 4'-0"

1"=10'-0" 10 5 0 10'

1"=4'-0" 4 2 0 4'

NOTES:

1. CONTRACTOR SHALL FIELD VERIFY LOCATION AND ELEVATION OF EXISTING RA PIPE ALONG WITH ALL CROSSINGS AND POTENTIAL CONFLICTS FOR NEW RA PIPE PRIOR TO SUBMITTALS FOR PIPE MATERIALS AND PIPE LAYOUT AND PRIOR TO ORDERING MATERIALS.
2. NEW RA PIPE SHALL BE INSTALLED AT THE SAME DEPTH AS THE EXISTING RA PIPE (~3.5 FT ±), UNLESS MODIFICATIONS ARE REQUIRED BASED ON THE FINDINGS FROM THE EFFORT IN NOTE 1. CONTRACTOR SHALL COORDINATE WITH OWNER AND ENGINEER FOR ANY PIPE ROUTE MODIFICATIONS.
3. ALL NEW RA PIPE JOINTS AND FITTINGS SHALL BE RESTRAINED.
4. NEW ROAD SHALL MATCH ELEVATIONS AND SLOPES OF EXISTING ROAD.
5. NEW ASPHALT TO LIMITS SHOWN. IN THE EVENT THAT PAVEMENT IS DAMAGED BEYOND THE LIMITS SHOWN, THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL AND REPLACEMENT OF THE PAVEMENT UP TO AND INCLUDING THE DAMAGED AREAS.
6. NEW ASPHALT AND ROAD RESTORATION WHERE AREAS OF NEW PIPE IS INSTALLED UNDER PAVEMENT SHALL BE PER DETAIL ENG 2 ON SHEET C05. NEW ASPHALT AND ROAD RESTORATION OUTSIDE OF PIPE INSTALLATION SHALL BE PER TYPICAL PAVEMENT RESURFACE DETAIL ON SHEET C05.
7. REPLACE PAVEMENT AFTER ALL HEAVY CONSTRUCTION ACTIVITIES HAVE BEEN COMPLETED.
8. CONTRACTOR SHALL PROTECT AND SUPPORT EXISTING DUCT BANKS AND PIPING DURING INSTALLATION OF CROSSINGS. ANY DAMAGE TO THE EXISTING ITEMS SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER:	A. COLEMAN
DESIGNED BY:	RDM
DRAWN BY:	ESM
CHECKED BY:	AJC
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE	0 1/2" 1"

Name: Date:
Florida Professional Engineer's Registration Number:

Hazen

HAZEN AND SAWYER
7334 DELAINEY COURT
SARASOTA, FLORIDA 34240

CITY OF VENICE, FLORIDA

EASTSIDE WATER RECLAMATION FACILITY
REAERATION BLOWER REPLACEMENT PROJECT

CIVIL
PROPOSED SITE PLAN AND
YARD PIPING PLAN

DATE:	FEBRUARY 2017
HAZEN NO.:	41078-006
CONTRACT NO.:	
DRAWING NUMBER:	C04

PLOT DATE: 2017/02/13 11:15:11 AM BY: MCALZON
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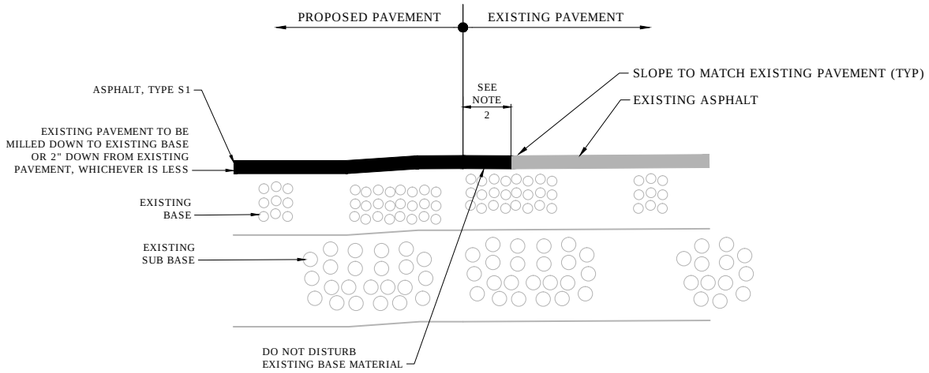


NOTES:

1. TYPICAL DETAIL FOR AREAS TO BE MILLED AND RE-SURFACECD.
2. AT LOCATIONS WHERE OVERLAY WILL TIE- IN TO EXISTING PAVEMENT, CONTRACTOR SHALL SAW-CUT A CLEAN STRAIGHT EDGE OF THE EXISTING PAVEMENT (TYP) ALONG THE PROPOSED RESURFACE AREA, AND MATCH THE THICKNESS OF THE EXISTING PAVEMENT.

TYPICAL PAVEMENT RESURFACE

A.) **HEAVY DUTY**: COMMERCIAL AND INDUSTRIAL DEVELOPMENTS WITHIN PRIMARY ACCESSWAYS, PARKING LOTS, ETC. WITH EXPOSURE TO TRUCK TRAFFIC

B.) **LIGHT DUTY**: RESIDENTIAL SUBDIVISIONS AND COMMERCIAL DEVELOPMENTS WITHIN LOW VOLUME ACCESSWAYS, PARKING LOTS, ETC. (LESS THAN 5% TRUCK TRAFFIC)

	A	B
SUBGRADE - TYPE B STABILIZED LBR 40 MIN.	12"	8"
ABC3 - ASPHALT BASE	5"	4"
CTB	10"	7"
CCA	10"	7"
ASPHALTIC CONCRETE	1 1/2" OF S-1	1 1/2" OF S-1/S-3

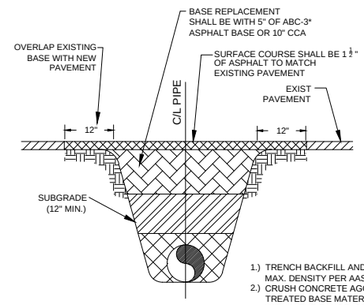
CONCRETE PAVEMENT FOR PARKING LOTS ONLY:

SUBGRADE - 12" TYPE B STABILIZED LBR 40 MIN.

PAVEMENT - 6" CONCRETE 3000PSI @28 DAYS WITH MAX. 4" SLUMP & FIBER REINFORCEMENT.

PAVEMENT STANDARD

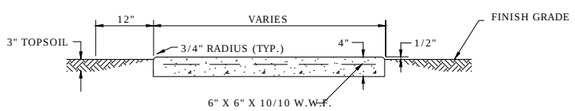
N.T.S.



1.) TRENCH BACKFILL AND SUBGRADE TO BE COMPACTED TO 98% OF MAX. DENSITY PER AASHTO T-180.
2.) CRUSH CONCRETE AGGREGATE MUST HAVE AN LBR ≥ 150. CEMENT TREATED BASE MATERIAL MUST YIELD COMPRESSIVE STRENGTH WITHIN THE RANGE OF 175 TO 275 PSI. SHELL IS NOT AN ACCEPTABLE BASE MATERIAL.

PAVEMENT RESTORATION DETAIL

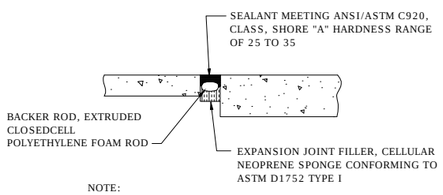
N.T.S.



NOTE:

THE CONTRACTOR SHALL CONSTRUCT AN EXPANSION JOINT AT SPACINGS SHOWN ABOVE, AT THE END OF DAYS WORK, POINTS OF CURVATURE, AND AT ADJOINING STRUCTURES.

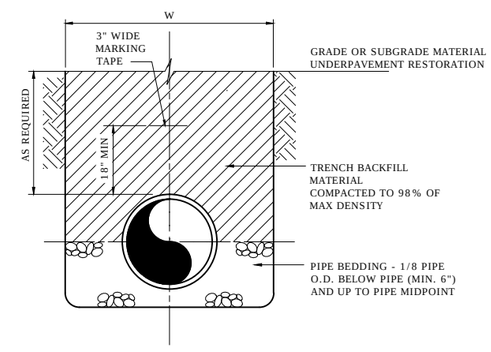
SIDEWALK SECTION



NOTE:

CONTRACTOR SHALL SUBMIT EXPANSION JOINT PRODUCT DATA SHEETS FOR REVIEW AND APPROVAL.

EXPANSION JOINT DETAIL



TRENCH EXCAVATION LIMITS		
INTERNAL DIAMETER OF PIPE	W WIDTH OF TRENCH	
	MAX	W=MIN
4"-6"	3'-0"	2'-0"

W = TRENCH WIDTH AT BOTTOM OF PIPE. TRENCH SIDE SLOPES SHALL BE IN ACCORDANCE WITH OSHA REQUIREMENTS.

PIPE TRENCH DETAIL

CITY OF VENICE
ENGINEERING DEPARTMENT
401 WEST VENICE AVE.
VENICE FL 34285
(941) 486-2626
FAX (941) 480-3031

ENGINEERING

PAVEMENT & RESTORATION

DATE JAN. 2016

SHEET NO. ENG-2

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER:	A. COLEMAN
DESIGNED BY:	RDM
DRAWN BY:	ESM
CHECKED BY:	AJC
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE	0 1/2" 1"

Name: Date:
Florida Professional Engineer's Registration Number:

Hazen
HAZEN AND SAWYER
7334 DELAINEY COURT
SARASOTA, FLORIDA 34240

CITY OF VENICE, FLORIDA

EASTSIDE WATER RECLAMATION FACILITY
REAERATION BLOWER REPLACEMENT PROJECT

CIVIL DETAILS

DATE: FEBRUARY 2017
HAZEN NO.: 41078-006
CONTRACT NO.:
DRAWING NUMBER: C05

PLOT DATE: 2017/02/13 11:23:34 AM BY: MCALZON
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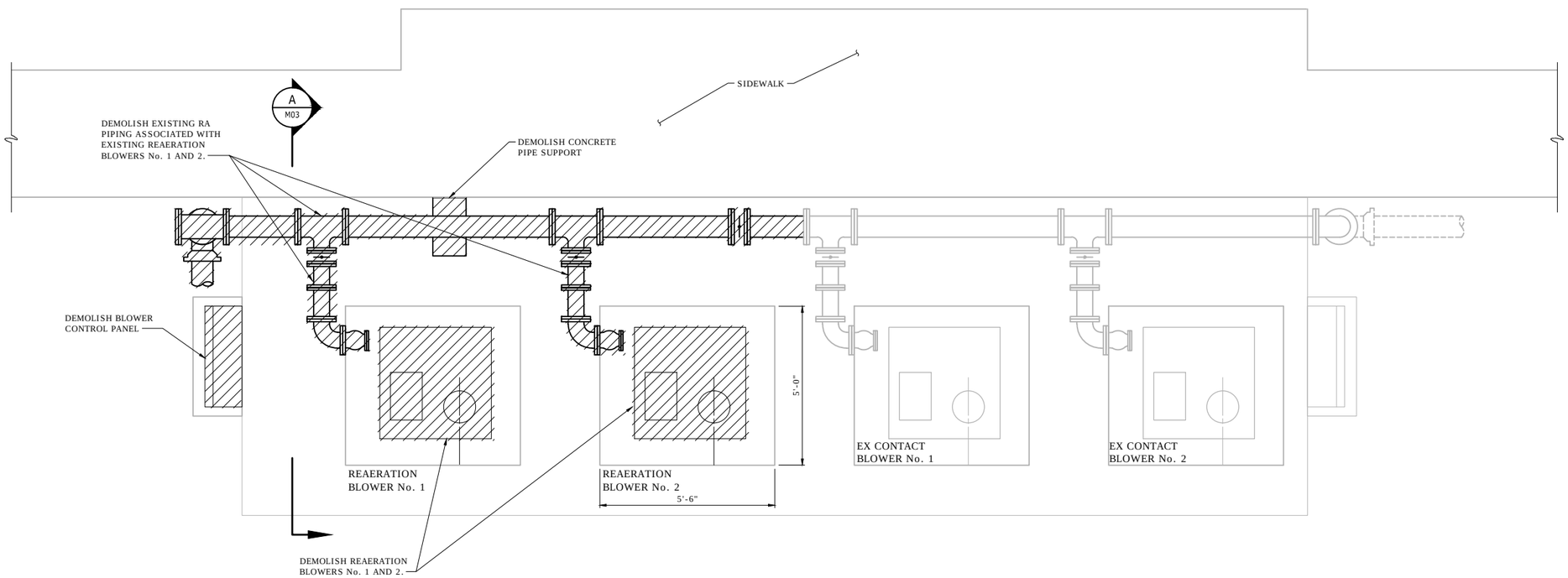


DEMOLITION PLAN

1/2"=1'-0"

NOTES:

1. CONCRETE DEMOLITION SHALL BE SELECTIVE DEMOLITION BY CORE DRILLING OR SAWCUTTING AND CAREFUL REMOVAL OF CONCRETE SHOWN TO BE REMOVED. NO OVER CUTTING OF AREAS TO BE DEMOLISHED SHALL BE PERMITTED. CONTRACTOR SHALL CORE DRILL CORNERS OF OPENING PRIOR TO SAWCUTTING. EXPLOSIVES SHALL NOT BE USED FOR DEMOLITION WORK. VIBRATORY HAMMERS SHALL NOT BE USED FOR SELECTIVE DEMOLITION OF REINFORCED CONCRETE. WHERE VIBRATORY HAMMERS ARE USED, REPAIR AND REPLACEMENT OF DAMAGED REINF CONCRETE ADJACENT TO THE DEMOLITION SHALL BE AT THE CONTRACTOR'S EXPENSE.

2. REMOVE AND/OR BURN BACK ANCHORS AND REINFORCEMENT STEEL 1/2" MIN BELOW SURFACE AND VOIDS CREATED SHALL BE FILLED WITH EPOXY RESIN BINDER. SUCH AS "SIKADUR 52" BY SIKA CORPORATION, "DURALCRETE LV" BY EUCLID CHEMICAL COMPANY, OR EQUAL.

3. WHERE DRAWINGS INDICATE A CONCRETE SUPPORT TO BE DEMOLISHED, THE FLOOR SLAB SURFACE SHALL BE REPAIRED AS APPROVED BY ENGINEER. FOLLOWING SELECT DEMOLITION AND REMOVAL OF THE SUPPORT REMOVAL THE REPAIR SHALL BE:

   A. SAWCUT THE FLOOR AROUND THE SUPPORT PERIMETER TO A DEPTH OF 1/4".
   B. SCARIFY AND REMOVE SLAB CONCRETE WITHIN THE PERIMETER TO A NOMINAL 1/4" DEPTH CLEAN AND REMOVE ALL CONCRETE LAITANCE.
   C. RESURFACE THE AREA BY APPLYING A POLYMER MODIFIED OR SILICA FUME ENHANCED CEMENTITIOUS REPAIR MORTAR, APPROVED BY THE ENGINEER, FOLLOWING THE MANUFACTURER'S SURFACE PREPARATION AND APPLICATION RECOMMENDATIONS. LEVEL AND FINISH THE SURFACE TO MATCH THE FLOOR SLAB SURROUNDING AREA.

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER:	A. COLEMAN
DESIGNED BY:	RDM
DRAWN BY:	ESM
CHECKED BY:	AJC
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE	0 1/2" 1"

Name: Date:
Florida Professional Engineer's Registration Number:

Hazen

HAZEN AND SAWYER
7334 DELAINEY COURT
SARASOTA, FLORIDA 34240

CITY OF VENICE, FLORIDA

EASTSIDE WATER RECLAMATION FACILITY
REAERATION BLOWER REPLACEMENT PROJECT

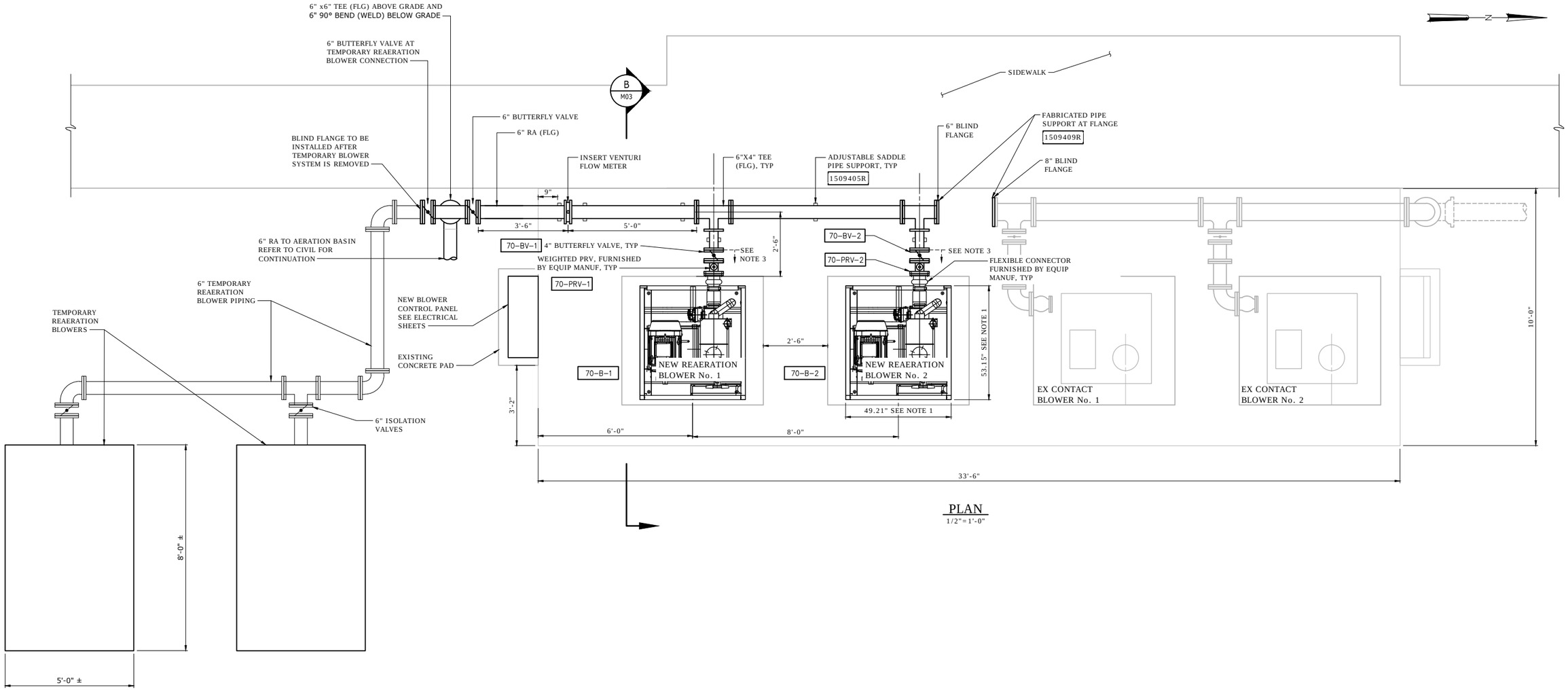
MECHANICAL
BLOWER AREA
DEMOLITION PLAN

DATE:	FEBRUARY 2017
HAZEN NO.:	41078-006
CONTRACT NO.:	
DRAWING NUMBER:	M01

PLOT DATE: 2017/02/13 11:02:25 AM BY: MCALZON
File: H:\41078-006 EASTSIDE WRF BLOWER REPLACEMENT\DRAWINGS\MECHANICAL\M01 Saved By MCALZON Save Date: 2017/02/08 9:57 AM

NOTES:

1. CONTRACTOR TO COORDINATE WITH THE CHOSEN BLOWER MANUFACTURER ON THESE DIMENSIONS. DIMENSIONS SHOWN ARE MAXIMUM ALLOWED TO FIT ON THE EXISTING CONCRETE PAD.
2. TEMPORARY BLOWER FEED PIPING SHALL BE INSTALLED ABOVE GROUND WITH RESTRAINED JOINTS AND SUPPORTS. PIPE LAYOUT SUPPORT TYPE AND SPACING SHALL BE DETERMINED BY CONTRACTOR.
3. POSITIVE DISPLACEMENT BLOWER PACKAGE BY BLOWER MANUFACTURER.



PLAN
1/2"=1'-0"

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER:	A. COLEMAN
DESIGNED BY:	RDM
DRAWN BY:	ESM
CHECKED BY:	AJC
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE	0 1/2" 1"

Name: Date:
Florida Professional Engineer's Registration Number:

Hazen

HAZEN AND SAWYER
7334 DELAINEY COURT
SARASOTA, FLORIDA 34240

CITY OF VENICE, FLORIDA

EASTSIDE WATER RECLAMATION FACILITY
REAERATION BLOWER REPLACEMENT PROJECT

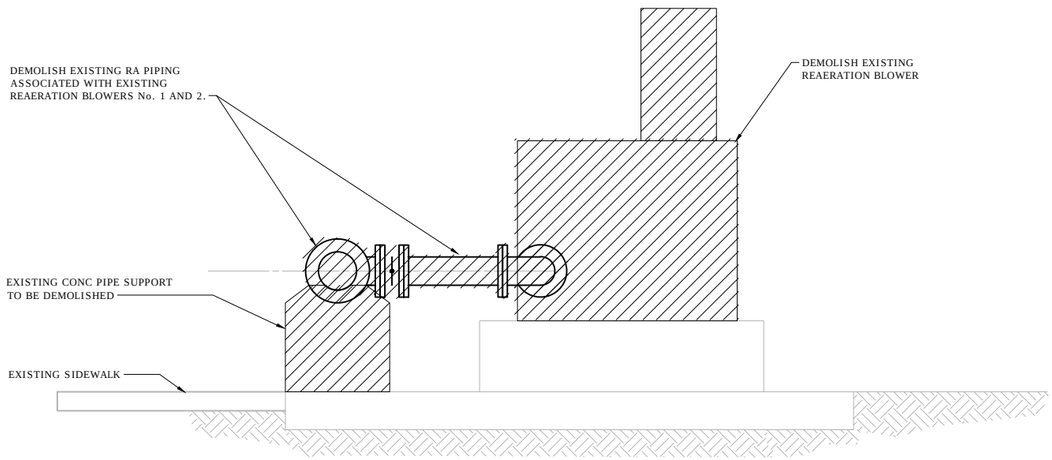
MECHANICAL
BLOWER AREA
PROPOSED PLAN

DATE: FEBRUARY 2017
HAZEN NO.: 41078-006
CONTRACT NO.:
DRAWING NUMBER: M02

PLOT DATE: 2017/02/13 11:01:11 AM BY: MCALZON
File: H:\41078-006 EASTSIDE WRF BLOWER REPLACEMENT\DRAWINGS\MECHANICAL\M02 Saved By MCALZON Save Date: 2016/12/20 3:43 PM

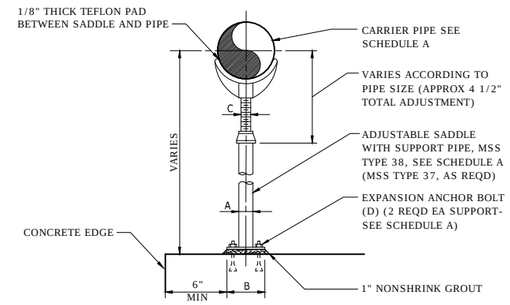
NOTES:

1. CONTRACTOR TO VERIFY RA PIPING ELEVATION BASED ON CHOSEN BLOWER MANUFACTURER.
2. POSITIVE DISPLACEMENT BLOWER PACKAGE BY BLOWER MANUFACTURER.



DEMOLITION

SECTION A M01
3/4" = 1'-0"



ADJUSTABLE SADDLE PIPE SUPPORT

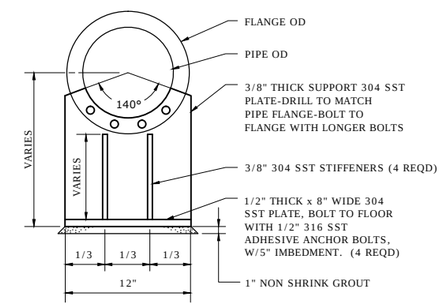
1509405-R

SCHEDULE A				
ADJUSTABLE SADDLE (DIM IN INCHES)				
PIPE SIZE	A	B	C	D DIA x LG
4-12	3	7 1/2	2 1/2	5/8 x 5

1509401-R

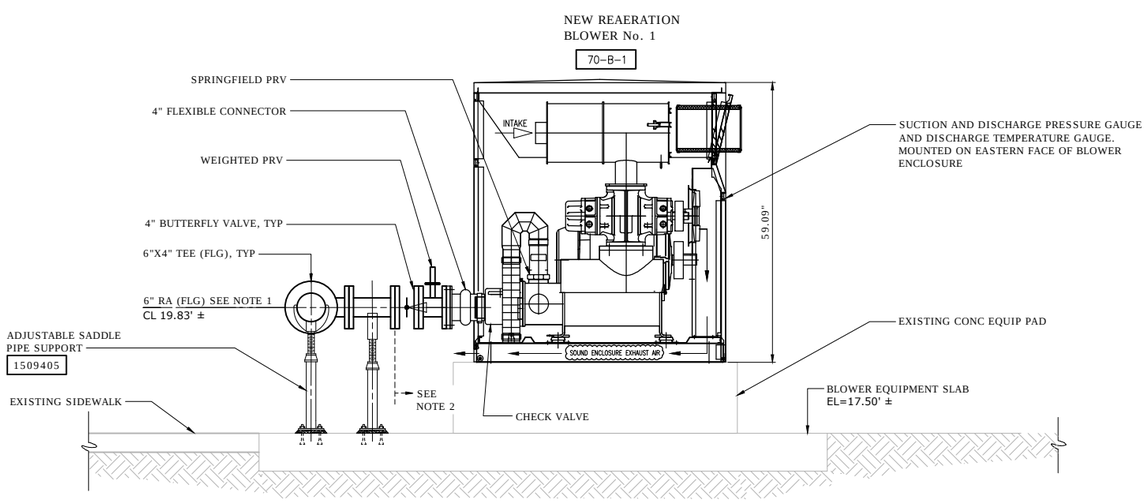
NOTE:

1. WHAT IS SHOWN IS TYPICAL OF DEMOLITION FOR THE EXISTING BLOWERS.



FABRICATED PIPE SUPPORT (AT FLANGE)

1509409R



PROPOSED

SECTION B M02
3/4" = 1'-0"

NOTE:

1. WHAT IS SHOWN IS TYPICAL INSTALLATION FOR BOTH POSITIVE DISPLACEMENT BLOWER PACKAGES.

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER:	A. COLEMAN
DESIGNED BY:	RDM
DRAWN BY:	ESM
CHECKED BY:	AJC
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE	0 1/2" 1"

Name: Date:
Florida Professional Engineer's Registration Number:

Hazen

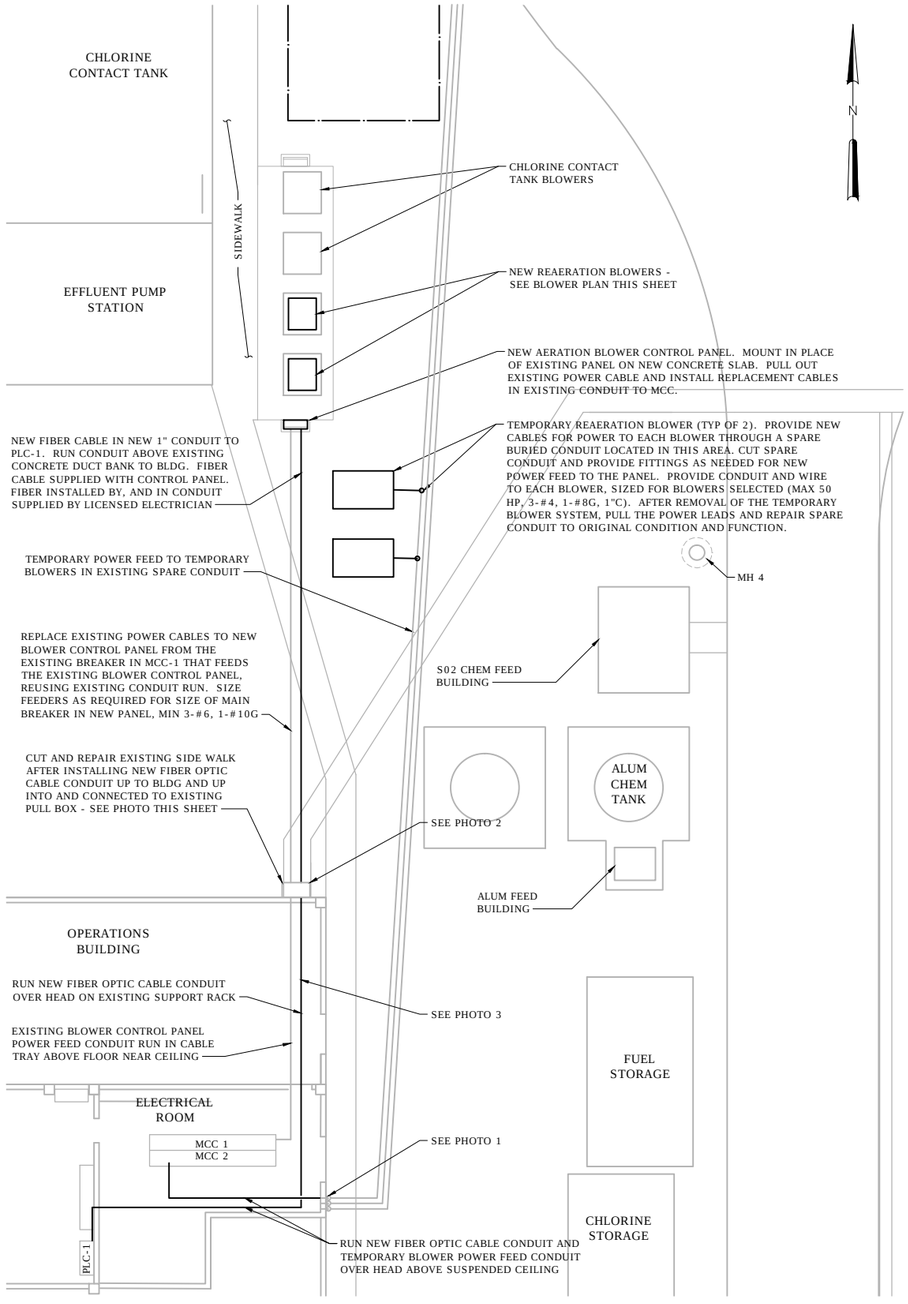
HAZEN AND SAWYER
7334 DELAINEY COURT
SARASOTA, FLORIDA 34240

CITY OF VENICE, FLORIDA

EASTSIDE WATER RECLAMATION FACILITY
REAERATION BLOWER REPLACEMENT PROJECT

MECHANICAL
BLOWER AREA
SECTIONS AND DETAILS

DATE:	FEBRUARY 2017
HAZEN NO.:	41078-006
CONTRACT NO.:	
DRAWING NUMBER:	M03



ELECTRICAL SITE PLAN

1"=10'

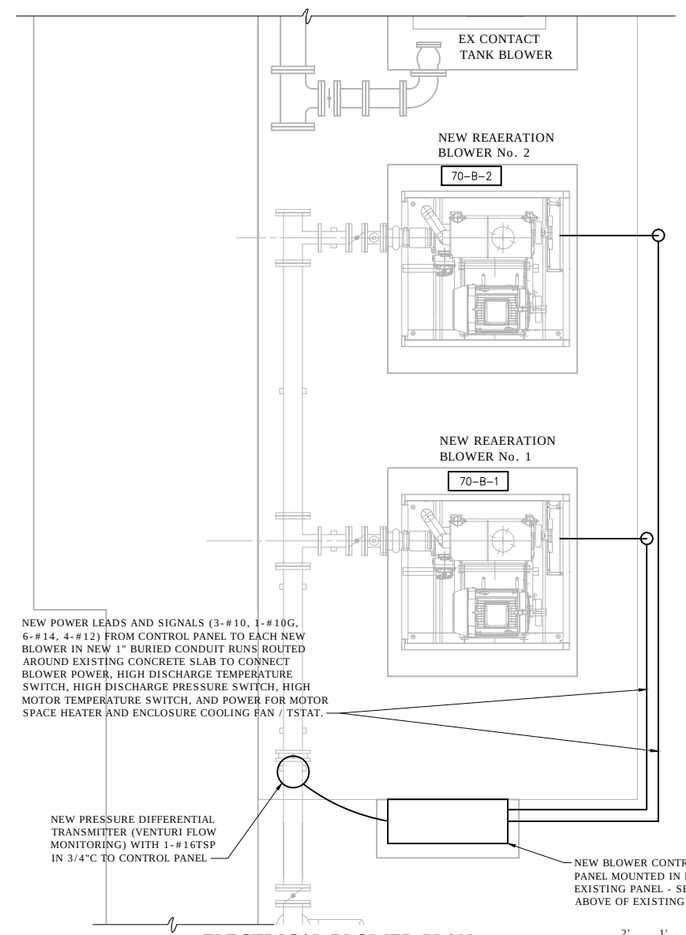
EXISTING BLOWERS TO BE REPLACED, GROUND BLOWERS AND ENCLOSURES TO EXISTING GROUND CABLES.

EXISTING BLOWER CONTROL PANEL TO BE REPLACED WITH THE FOLLOWING REQUIREMENTS:

1. REMOVE EXISTING PANEL AND BASE PAD PROTECTING EXISTING CONDUITS.
2. FRONT FACE OF NEW PANEL TO FACE NORTH (OPPOSITE OF EXISTING PANEL).
3. FRONT FACE OF NEW PANEL TO BE A MINIMUM OF 42" CLEARANCE TO NEW BLOWER ENCLOSURE.
4. PROVIDE NEW CONCRETE BASE PAD FOR NEW PANEL, MIN 6" THICK, #5 EW CTRD, MIN 3" OUTSIDE LIMITS OF PANEL LEGS.
5. INSTALL NEW 3/4" DIAMETER, MIN 20' LONG BARE COPPER GROUND ROD WITHIN A FOOT OF THE PANEL AND CONNECT WITH MIN #2/0 COPPER GROUND CABLE - CONNECT GROUND ROD TO EXISTING NEARBY GROUND SYSTEM IF FOUND.

EXISTING BLOWERS

NTS



ELECTRICAL BLOWER PLAN

1/2"=1'-0"

SPARE CONDUIT RUN UP TO BUILDING, EXTEND CONDUIT RUN INTO BUILDING WITH NEW HOLE IN CMU, INSTALL NEW CONDUIT TO SPARE BREAKER IN MCC 2 ABOVE THE EXISTING SUSPENDED CEILING, AND SEAL ANNULAR SPACE AROUND CONDUIT IN THE CMU WITH APPROVED SEALENT.

PHOTO 1

SPARE CONDUITS FOR TEMPORARY BLOWERS

NTS

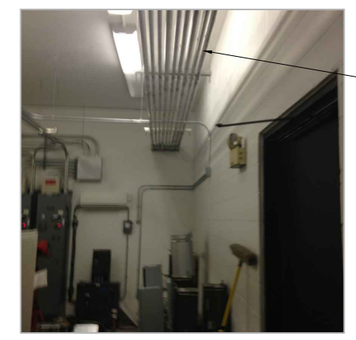
EXISTING DUCT BANK TERMINATION PULL BOX. PROVIDE SEALED CONDUIT ENTRY BOTTOM CONNECTION INTO BOX FOR NEW FIBER OPTIC CABLE CONDUIT FROM BLOWER PANEL.

SAW CUT AND REPLACE EXISTING CONCRETE SIDEWALK TO INSTALL NEW FIBER OPTIC CABLE CONDUIT ON MATCHING SUPPORTS UP INTO BOX.

PHOTO 2

EXISTING ELEVATED PULL BOX FOR CONDUIT ENTRY INTO BUILDING

NTS



DOUBLE ROW OF OVERHEAD CONDUIT FROM EXTERIOR PULL BOX TO ELECTRICAL ROOM (ABOVE SUSPENDED CEILING AT THAT POINT)

INSTALL NEW 1" CONDUIT FOR NEW FIBER OPTIC CABLE FROM PULL BOX TO PLC1 PANEL USING EXISTING SUPPORT STRUCTURE WITH MATCHING HARDWARE.

PHOTO 3

EXISTING OVERHEAD CONDUIT RUN FROM EXTERIOR PULL BOX TO ELECTRICAL ROOM

NTS

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER:	A. COLEMAN
DESIGNED BY:	DBS
DRAWN BY:	DBS
CHECKED BY:	AJC
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE	0 1/2" 1"

Name: Date:

Florida Professional Engineer's Registration Number:

Hazen

HAZEN AND SAWYER
7334 DELAINEY COURT
SARASOTA, FLORIDA 34240

CITY OF VENICE, FLORIDA

EASTSIDE WATER RECLAMATION FACILITY
REAERATION BLOWER REPLACEMENT PROJECT

ELECTRICAL
ELECTRICAL PLANS

DATE:	FEBRUARY 2017
HAZEN NO.:	41078-006
CONTRACT NO.:	
DRAWING NUMBER:	E01

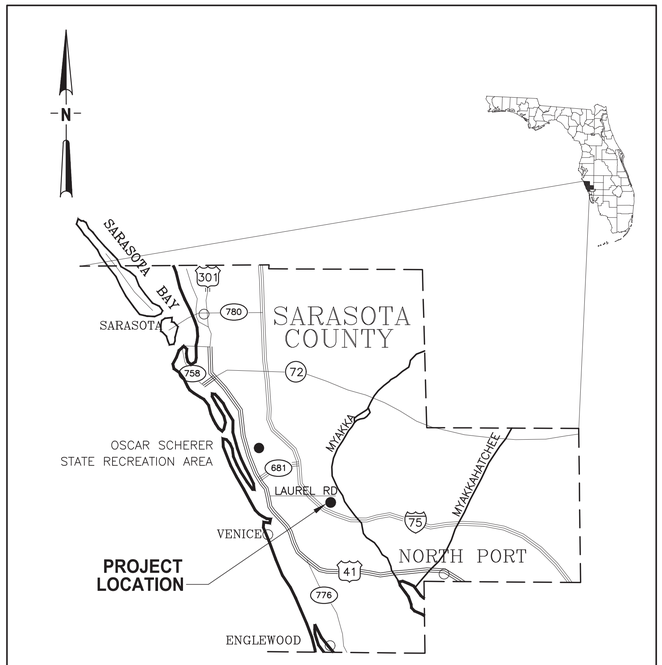
PLOT DATE: 2017/02/13 10:57:34 AM BY: MCALZON
File: H:\41078-006 EASTSIDE WRF BLOWER REPLACEMENT\DRAWINGS\ELECTRICAL\E01 Saved By MCALZON Save Date: 2016/12/20 4:01 PM

Plotted: 2/12/18 1:25pm JKramer

EASTSIDE WATER RECLAMATION FACILITY
PLANT LIFT STATION FORCE MAIN
RELOCATION PROJECT

PREPARED FOR:

CITY OF VENICE, FLORIDA



PROJECT VICINITY

Venice, Florida
"City on the Gulf"

PREPARED BY:

JonesEdmunds
CERTIFICATE OF AUTHORIZATION #1841
730 NE WALDO ROAD, GAINESVILLE, FLORIDA 32641 / (352) 377-5821
7230 KYLE COURT, SARASOTA, FLORIDA 34240 (941) 358-1440

PROJECT LOCATION

CITY OF VENICE CIP NO: 95944
JONES EDMUNDS PROJECT NO: 22120-002-01

THIS ITEM HAS BEEN DIGITALLY SIGNED AND SEALED BY DOUGLAS ROY YOUNG, PE, LICENSE NO. 44204, ON FEBRUARY 12, 2018

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DOUGLAS ROY YOUNG LICENSE No. 44204 STATE OF FLORIDA PROFESSIONAL ENGINEER

Douglas R Young
Digitally signed by Douglas R Young
Date: 2018.02.12 16:16:03 -05'00'

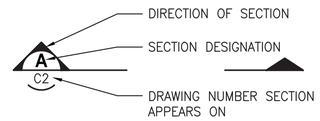
FEBRUARY 2018

BID SET

LAST SAVED: 2/12/2018 1:24 PM JKRAMER

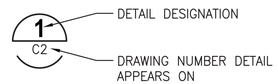
DRAWING INDEX

DWG. NO.	DESCRIPTION
GENERAL	
G1	COVER SHEET
G2	DRAWING INDEX
G3	ABBREVIATIONS
G4	GENERAL NOTES
G5	LEGENDS AND PIPE SCHEDULE
DEMOLITION	
D1	DEMOLITION PLANS
CIVIL	
C1	EXISTING SITE PLAN
C2	PROPOSED SITE AND YARD PIPING PLAN
C3	CIVIL DETAILS
STRUCTURAL	
S1	GENERAL NOTES, KEY PLAN AND PHOTOGRAPH
S2	STAIRS PLANS AND SECTION
S3	MISCELLANEOUS DETAILS
S4	PIPE SUPPORT DETAILS
MECHANICAL	
M1	HEADWORKS PIPING MODIFICATION PLAN AND SECTION



SECTION DESIGNATION

SECTION DESIGNATION



DETAIL DESIGNATION

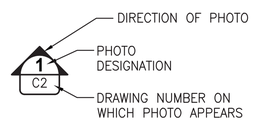


PHOTO DESIGNATION

BID SET

DOUGLAS ROY YOUNG
LICENSE
No. 44204
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

LTR.	DATE	REVISIONS	BY	APPRD.

DESIGNED DYOUNG
DRAWN JKRAMER
CHECKED JBANKS

JonesEdmunds
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730 NE WALDO ROAD, GAINESVILLE, FLORIDA 32641 / (352) 377-5821
7230 KYLE COURT, SARASOTA, FLORIDA 34240 (941) 358-1440

EASTSIDE WATER RECLAMATION FACILITY
LS FORCE MAIN RELOCATION PROJECT
CITY OF VENICE, FLORIDA

DRAWING INDEX

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DATE	PROJECT NO.
FEB. 2018	22120-002-01
SCALE	DWG. NO.
NONE	G2

STANDARD ABBREVIATIONS

&	AND
@	AT
A	AUTOMATIC
AA STD	ALUMINUM ASSOCIATION STANDARD
AASHTO	AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
AC	ASBESTOS CEMENT
AC	ALTERNATING CURRENT
AC	AIR CONDITIONER
ACI	AMERICAN CONCRETE INSTITUTE
ADJ	ADJUSTABLE
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AIP	ABANDONED IN PLACE
AISI	AMERICAN IRON STEEL INSTITUTE
AIT	ANALYTICAL INDICATING TRANSMITTER
ALT	ALTERNATIVE
ALUM	ALUMINUM
AM	AUTO–MANUAL
AMPS	AMPERES
ANSI	AMERICAN NATION STANDARDS INSTITUTE
AP	ANALYZER PANEL
APP	APPROVE, APPROVED
APPROX	APPROXIMATE
AR	AIR RELEASE
ARV	AIR RELEASE VALVE
ASCE	AMERICAN SOCIETY OF CIVIL ENGINEERS
ASD	ADJUSTABLE SPEED DRIVE
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
ATS	AUTOMATIC TRANSFER SWITCH
AUTO	AUTOMATIC
AUX	AUXILIARY
AVE	AVENUE
AWG	AMERICAN WIRE GUAGE
AWS	AMERICAN WELDING SOCIETY
AWWA	AMERICAN WATER WORKS ASSOCIATION
B/	BOTTOM OF
B/L	BASELINE OF CONSTRUCTION
BC	BARE COPPER
BF	BLIND FLANGE
BFP	BACKFLOW PREVENTER
BFV	BUTTERFLY VALVE
BKR	BREAKER
BLD	BLIND
BLDG	BUILDING
BLVD	BOULEVARD
BM	BENCH MARK
BO	BLOW–OFF
BTM	BOTTOM
BTM/	BOTTOM OF
BV	BALL VALVE
BYP	BYPASS
C	CONDUIT, CONDUCTOR, CLOSE
C/L, CL	CENTERLINE
CAM	COMPUTER–AUTO–MANUAL
CAT	CATALOGUE
CB	CIRCUIT BREAKER
CC	CENTER TO CENTER
CCS	CENTRAL CONTROL SYSTEM
CF	COLUMN FOUNDATION
CFWE	CABLE FURNISHED WITH EQUIPMENT
CI	CAST IRON
CIP	CAST IN PLACE, CAST IRON PIPE
CISP	CAST IRON SLIP PIECE
CJ	CONSTRUCTION/CONTRACTION JOINT
CLF	CHAIN LINK FENCE
CLR	CLEAR
CM	COMPUTER–MANUAL
CMP	CORRUGATED METAL PIPE
CMU	CONCRETE MASONRY UNIT
CO	CLEANOUT
CO	COMPANY
COL	COLUMN
COM	COMMUNICATION
CON	CONCENTRIC
CONC	CONCRETE
CONSTR	CONSTRUCTION
CONT	CONTINUOUS
CORP	CORPORATION
CP	CONTROL PANEL
CPT	CONTROL POWER TRANSFORMER
CRE	CORROSION RESISTANT
CRSI	CONCRETE REINFORCING STEEL INSTITUTE
CS	CARBON STEEL
CT	CURRENT TRANSFORMER, CABLE TRAY CONTACTOR
CTRD	CENTERED
CV	CHECK VALVE
D	DRAIN
DB	DUCT BANK
DBI	DITCH BOTTOM INLET
DC	DIRECT CURRENT
°	DEGREE
DES	DESIGNATION
DET	DETAIL
DI	DUCTILE IRON
DIA, ø	DIAMETER
DIP	DUCTILE IRON PIPE
DIPS	DUCTILE IRON PIPE SIZE
DIV	DIVISION
DN	DOWN, DAMPER
DR	DIMENSION RATIO
DWG	DRAWING
DXS	DOUBLE EXTRA STRONG
E	ELECTRIC ACTUATOR
EA	EACH
ECC	ECCENTRIC
EES	EMERGENCY EYEWASH AND SHOWER
EF	EACH FACE, EXHAUST FAN
EG	SUCH AS
EJ	EXPANSION JOINT
EL, ELEV	ELEVATION
ELB	ELBOW
ELEC	ELECTRICAL
EOP	EDGE OF PAVEMENT
EQ	EQUAL
ERCP	ELLIPTICAL REINFORCED CONCRETE PIPE
EST	ELEVATED STORAGE TANK
ETC	ETCETERA
EW	EACH WAY
EXIST	EXISTING
FBC	FLORIDA BUILDING CODE
F, FU	FUSE
F/F	FINISHED FLOOR
FAB	FABRICATED
FAC	FLORIDA ADMINISTRATIVE CODE
FCA	FLANGED COUPLING ADAPTER
FCV	FLOW CONTROL VALVE
FDEP	FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
FDN	FOUNDATION
FDOT	FLORIDA DEPARTMENT OF TRANSPORTATION
FDR	FEEDER
FE	FLOW ELEMENT
FF	FINISHED FLOOR
FFE	FINISHED FLOOR ELEVATION
FG	FINISHED GRADE, FIBERGLASS
FH	FIRE HYDRANT
FIG	FIGURE
FIN	FINISHED
FIT	FLOW INDICATING TRANSMITTER
FJ	FLANGED JOINT
FL	FLOOR
FLEX	FLEXIBLE
FLG	FLANGE(D)
FND	FOUNDATION
FNPT	FEMALE NATIONAL PIPE THREAD
FO	FIBER OPTIC
FOS	FAST–OFF–SLOW
FOSA	FAST–OFF–SLOW–AUTO
FOSR	FAST–OFF–SLOW–REMOTE
FP	FULL PENETRATION, FIELD PANEL
FR	FORWARD–REVERSE
FREQ	FREQUENCY
FRP	FIBER REINFORCED PLASTIC
FS	FLORIDA STATUTES, FAR SIDE, FLOW SWITCH
FT	FOOT
G	GROUND
GAL	GALLON
GALV	GALVANIZED
GEN	GENERATOR
GFCI	GROUND FAULT CIRCUIT INTERUPTER
GND	GROUND
GPM	GALLONS PER MINUTE
GR	GRADE
GRTG	GRATING
GS	GALVANIZED STEEL
GSP	GALVANIZED STEEL PIPE
GST	GROUND STORAGE TANK
GV	GATE VALVE
H	HIGH
HD	HAND
HDD	HORIZONTAL DIRECTIONAL DRILL
HDNS	HARDNESS
HDPE	HIGH DENSITY POLYETHYLENE
HHWL	HIGH HIGH WATER LEVEL
HK	HOOK
HOA	HAND–OFF–AUTO
HOR	HAND–OFF–REMOTE
HORIZ	HORIZONTAL
HP	HORSEPOWER
HPS	HIGH PRESSURE SODIUM
HR	HANDRAIL
HSP	HIGH SERVICE PUMP
HT	HEIGHT
HWL	HIGH WATER LEVEL
I&C	INSTRUMENTATION AND CONTROL
ICC	INTERNATIONAL CODE COUNCIL
IC	INTERRUPTING CAPACITY
ID	INSIDE DIAMETER
IE	INVERT ELEVATION
IEEE	INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS
IF	INSULATED FLANGE
IJ	ISOLATION JOINT
INC	INCORPORATED
IPS	IRON PIPE SIZE
J, JB	JUNCTION BOX
JT	JOINT
KA	KILOAMPERES
KB	KNEE BRACE
KCMIL	THOUSAND CIRCULAR MILS
KV	KILOVOLT
KVA	KILOVOLT AMPERES
KW	KILOWATTS
KWH	KILOWATT HOUR
L	LOWER
LB, LBS	POUND(S)
LE	LEVEL ELEMENT
LEL	LOWER EXPLOSIVE LIMIT
LF	LINEAR FEET
LG	LONG
LIT	LEVEL INDICATING TRANSMITTER
LIU	LIGHT INTERFACE UNIT
LLH	LONG LEG HORIZONTAL
LLV	LONG LEG VERTICAL
LLWL	LOW LOW WATER LEVEL
LOS	LOCKOUT STOP
LR	LONG RADIUS, LOCAL–REMOTE
LS	LIFT STATION
LSIG	LONG SHORT INSTANTANEOUS GROUND
LWL	LOW WATER LEVEL
M	MAGNETIC CONTACTOR COIL, MOTOR, MANUAL
M/F	MALE/FEMALE
MAX	MAXIMUM
MC	MODULATE–CLOSE
MCC	MOTOR CONTROL CENTER
MCJ	MASONRY CONTROL JOINT
MECH	MECHANICAL
MES	MITERED END SECTION
MFR	MANUFACTURER
MH	MANHOLE
MIN	MINIMUM
MISC	MISCELLANEOUS
MJ	MECHANICAL JOINT
MNPT	MALE NATIONAL PIPE THREAD
MO	MOTOR OPERATOR
MP	METERING PUMP
MPH	MILES PER HOUR
MS	MOTOR STARTER
MSC	MANUFACTURER SUPPLIED CABLE
MT, MTD	MOUNT(ED)
MTL	METAL
MV	MEDIUM VOLTAGE
#	NUMBER, POUND
N	NORTH(ING), NEUTRAL, NORMAL
N/A	NOT APPLICABLE
NAD	NORTH AMERICAN DATUM
NAVD	NORTH AMERICAN VERTICAL DATUM
NC	NORMALLY CLOSED
NE	NORTH EAST
NEC	NATIONAL ELECTRICAL CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NEUT	NEUTRAL
NGVD	NATIONAL GEODETIC VERTICAL DATUM
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NOM	NOMINAL
NPDES	NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
NPT	NATIONAL PIPE THREAD
NRS	NONRISING STEM
NS	NEAR SIDE
NSF	NATIONAL SANITATION FOUNDATION
NTS	NOT TO SCALE
NW	NORTH WEST
OC	ON CENTER(S), OPEN–CLOSE(D)
OCA	OPEN–CLOSE–AUTO
OCR	OPEN–CLOSE–REMOTE
OD	OUTSIDE DIAMETER
OF	OVERFLOW
OO	ON–OFF
OOA	ON–OFF–AUTO
OOR	ON–OFF–REMOTE
OPP	OPPOSITE
ORP	OXIDATION REDUCTION POTENTIAL
OS&Y	OUTSIDE STEM AND YOKE
OSC	OPEN–STOP–CLOSE
OSHA	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
P&ID	PIPING AND INSTRUMENTATION DIAGRAM
P/L	PROPERTY LINE
PB	PULL BOX
PCCP	PRESTRESSED CONCRETE CYLINDER PIPE
PCV	PRESSURE CONTROL VALVE
PE	PLAIN END, POLYETHYLENE
PET	POLYETHYLENE TUBING
PF	POWER FACTOR
pH	HYDROGEN ION CONCENTRATION
PH	PHASE
PI	PRESSURE INDICATOR/GAUGE
PID	PROPORTIONAL INTEGRAL DERIVATIVE
PIT	PRESSURE INDICATING TRANSMITTER
PIV	POST INDICATOR VALVE
PL	PLATE
PLC	PROGRAMMABLE LOGIC CONTROLLER
PLCS	PLACES
POC	POINT OF CONNECTION
POE	POINT OF ENTRY
POJ	PUSH ON JOINT
PP	POWER POLE
PPE	PERSONAL PROTECTIVE EQUIPMENT
PRV	PRESSURE REDUCING VALVE
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PSIA	POUNDS PER SQUARE INCH ABSOLUTE
PSID	POUNDS PER SQUARE INCH DIFFERENTIAL
PSIG	POUNDS PER SQUARE INCH GAUGE
PSV	PRESSURE SUSTAINING VALVE
PT	PRESSURE TREATED, POTENTIAL TRANSFORMER
PV	PLUG VALVE
PVC	POLYVINYL CHLORIDE
PVMT	PAVEMENT
PWR	POWER
R	RADIUS
R/W, ROW	RIGHT–OF–WAY
RCP	REINFORCED CONCRETE PIPE
RCPT	RECEPTACLE
RED	REDUCER
REF	REFERENCE
REINF	REINFORCEMENT, REINFORCING
REQ, REQ'D	REQUIRED
RGS	RIGID GALVANIZED STEEL
RJ	RESTRAINED JOINT
RM	REMOTE MULTIPLEXING MODULE
RMS	ROOT MEAN SQUARE
RPZ	REDUCED PRESSURE ZONE
RT	RIGHT
RTU	REMOTE TELEMETRY UNIT
SARV	SURGE ANTICIPATOR RELIEF VALVE
SBC	STANDARD BUILDING CODE
SCH	SCHEDULE
SCJ	SAW CUT JOINT
SDI	STEEL DECK INSTITUTE
SE	SOUTH EAST
SEC	SECOND
SF	SLOWER–FASTER
SHEC	SHOULDERED–END COUPLING
SHT	SHEET
SIM	SIMILAR
SJI	STEEL JOINT INSTITUTE
SM	STATIC MIXER
SP	SPACING, SPACED
SPD	SURGE PROTECTIVE DEVICE
SQ	SQUARE
SR	STATE ROAD, SURGE RELIEF
SRV	SURGE RELIEF VALVE
SS	START–STOP
SS, SST	STAINLESS STEEL
SSC	SUPERVISORY SET POINT CONTROL
SSRV	SOLID STATE REDUCED VOLTAGE
ST	SHUNT TRIP
STA	STATION
STD	STANDARD
STL	STEEL
STS	STORMWATER SEWER
SW	SOUTH WEST, SWITCH
SWD	SIDE WATER DEPTH
SWJ	SOLVENT WELD JOINT
SWPPP	STORM WATER POLLUTION PREVENTION PLAN
SY	SQUARE YARD
T, THK	THICK
T/	TOP OF
T/B,T&B	TOP AND BOTTOM
TBM	TEMPORARY BENCHMARK
TEMP	TEMPERATURE
TGS	THREADED GALVANIZED STEEL
TGSP	THREADED GALVANIZED STEEL PIPE
TH	TOTAL HEAD
THD	THREADED
TJB	TERMINAL JUNCTION BOX
TK	TANK
TOC	TOP OF CONCRETE
TOS	TOP OF STEEL
TOSJ	TOP OF STEEL JOIST
TOW	TOP OF WALL
TS	TUBULAR STEEL
TSF	THICKENED SLAB FOOTING
TSP	TWISTED SHIELDED PAIR
TURB	TURBIDITY
TYP	TYPICAL
UG	UNDERGROUND
UL	UNDERWRITER'S LABORATORIES
ULC	ULTRASONIC LEVEL CONTROLLER
UNK	UNKNOWN
UNO	UNLESS NOTED OTHERWISE
UPS	UNINTERRUPTIBLE POWER SUPPLY
V	VOLTAGE, VOLTS
VERT	VERTICAL
VFD	VARIABLE FREQUENCY DRIVE
VH	VAPOR HEATER
VIB	VIBRATION
VIF	VERIFY IN FIELD
VP	VAPORIZER
W	WIDE, WATT
W/	WITH
W/O	WITHOUT
WCJ	WALL CONTROL JOINT
WF	WALL FOOTING
WGT	WEIGHT
WP	WORK POINT, WEATHERPROOF
WRF	WATER RECLAMATION FACILITY
WSE, WSEL	WATER SURFACE ELEVATION
WT	WEIGHT
WV	WATER VALVE
WWF	WELDED WIRE FABRIC
WWTF	WASTEWATER TREATMENT FACILITY
XFMR	TRANSFORMER
XS	EXTRA STRONG

CUSTOM ABBREVIATIONS

COV	CITY OF VENICE
SUE	SUBSURFACE UTILITY EXPLORATION

NOTES:

1. SEE LEGENDS AND PIPE SCHEDULE FOR ADDITIONAL ABBREVIATIONS.
2. NOT ALL ABBREVIATIONS MAY BE USED FOR THIS PROJECT.

DOUGLAS ROY YOUNG LICENSE No. 44204 STATE OF FLORIDA PROFESSIONAL ENGINEER

BID SET

LTR.	DATE	REVISIONS	BY	APPRD.

DESIGNED DYOUNG
DRAWN JKRAMER
CHECKED JBANKS

JonesEdmunds
CERTIFICATE OF AUTHORIZATION #1841
730 NE WALDO ROAD, GAINESVILLE, FLORIDA 32641 / (352) 377-5821
7230 KYLE COURT, SARASOTA, FLORIDA 34240 (941) 358-1440

EASTSIDE WATER RECLAMATION FACILITY
LS FORCE MAIN RELOCATION PROJECT
CITY OF VENICE, FLORIDA

ABBREVIATIONS

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DATE FEB. 2018
PROJECT NO. 22120–002–01
SCALE NONE
DWG. NO. G3

LAST SAVED: 10/4/2017 5:52 AM JKRAMER DWG LOCATION:\\TPA-MAIN\DRAFTING\22120 CITY OF VENICE\002-01 ERWF PLANT LS FM RELOCATE\CONTRACT DRAWINGS\GENERAL\22120002-G03.DWG

GENERAL NOTES

REFERENCED DATA

1. SURVEY CONTROL COORDINATE VALUES ARE TIED INTO THE FOLLOWING PREVIOUSLY ESTABLISHED CONTROL POINTS FROM EASTSIDE WRF AERATION SYSTEM AND HEADWORKS IMPROVEMENT PROJECT BY MWH.

NORTHING	EASTING	ELEVATION
1017536.71	525706.31	16.82
1017192.69	525706.18	16.68
1017526.16	525508.70	16.84
1017203.33	525504.51	16.97

COORDINATES ARE REFERENCED TO THE FLORIDA STATE PLANE COORDINATE SYSTEM, WEST ZONE, AND THE NORTH AMERICAN DATUM OF 1983, ADJUSTMENT OF 2007 (NAD 83/07). THE VERTICAL DATUM IS THE NATIONAL GEODETIC VERTICAL DATUM, OF 1929 (NGVD 29). FINAL RECORD DRAWINGS SHALL REFERENCE ALL ELEVATIONS TO NAVD 88. REFER TO SPECIFICATION SECTION 01785 RECORD DRAWINGS FOR ADDITIONAL INFORMATION.

2. INFORMATION CONTAINED HEREIN WAS OBTAINED FOR DESIGN PURPOSES AND MAY NOT BE AN ADEQUATE REPRESENTATION OF ACTUAL CONDITIONS FOR PROJECT CONSTRUCTION. EXISTING CONTOURS SHOWN REPRESENT INTERPOLATIONS/EXTRAPOLATIONS FROM THE BEST AVAILABLE SURVEY DATA. ALL RISKS RESULTING FROM THE USE OR INTERPRETATION OF THE SURVEY DATA SHOWN SHALL BE BORNE BY THE CONTRACTOR.

GENERAL

3. THE CONTRACTOR SHALL COORDINATE WITH WASTEWATER TREATMENT FACILITY STAFF TO ASSURE CONTINUOUS OPERATION OF THE FACILITY AND COMPLIANCE WITH ALL OPERATIONAL PERMIT REQUIREMENTS.

4. THE CONTRACTOR SHALL COMPLY WITH ALL CONDITIONS AND REQUIREMENTS OF ALL PERMITS (FDEP, ETC) OBTAINED FOR THIS PROJECT.

5. CONSTRUCTION MATERIALS QUALITY AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS AND STANDARDS.

6. THE CONTRACTOR IS ADVISED NOT TO SCALE FROM DRAWINGS BUT TO FIELD VERIFY ALL DIMENSIONS. THE DIMENSIONS OF SPECIFIED AND FURNISHED PRODUCTS AND MATERIALS TAKE PRECEDENCE OVER DIMENSIONS INDICATED ON THE DRAWINGS. IF SIGNIFICANT DEVIATIONS OCCUR, THE CONTRACTOR SHALL NOTIFY THE ENGINEER AT LEAST 72 HOURS PRIOR TO CONSTRUCTION FOR A DETERMINATION AND RESOLUTION.

7. THE CONTRACTOR SHALL FURNISH ALL LABOR, MATERIALS, EQUIPMENT AND INCIDENTALS REQUIRED TO PERFORM MISCELLANEOUS WORK NOT SHOWN BUT OBVIOUSLY NECESSARY FOR THE PROPER COMPLETION OF THE WORK.

CONSTRUCTION LAYOUT/LIMITS OF CONSTRUCTION

8. NO DISTURBANCE SHALL BE ALLOWED OUTSIDE OF THE RIGHT OF WAYS AND/OR THE LIMITS OF CONSTRUCTION SHOWN ON THE DRAWINGS UNLESS APPROVED BY THE OWNER OR SPECIFICALLY NOTED ON THE DRAWINGS.

EXISTING CONDITIONS

9. LOCATIONS, ELEVATIONS, AND DIMENSIONS OF EXISTING UTILITIES, STRUCTURES, AND OTHER FEATURES ARE SHOWN BASED ON THE BEST INFORMATION AVAILABLE AT THE TIME OF PREPARATION OF THESE DRAWINGS BUT ARE NOT PURPORTED TO BE ABSOLUTELY CORRECT. THERE MAY BE OTHER IMPROVEMENTS, UTILITIES, ETC. WHICH ARE WITHIN THE PROJECT AREA. CONTRACTOR SHALL SURVEY PRIOR TO CONSTRUCTION, USING A SURVEYOR LICENSED IN THE STATE OF FLORIDA, THE LOCATIONS, ELEVATIONS, DIMENSIONS, TYPES, AND CONDITIONS OF EXISTING UTILITIES, STRUCTURES, AND OTHER FEATURES (WHETHER OR NOT SHOWN ON THE DRAWINGS) WITHIN THE AREA EXTENDING 100 FEET BEYOND THE AREA AFFECTED BY CONSTRUCTION.

10. PRIOR TO SHOP DRAWING PREPARATION AND SUBMITTAL AND PURCHASE OF RELATED MATERIALS, THE CONTRACTOR SHALL FIELD VERIFY EXISTING UTILITIES (LOCATION, SIZE, MATERIALS OF CONSTRUCTION, OUTSIDE DIAMETER, WALL THICKNESS, ROUNDNESS, ELEVATIONS, ETC.) TO WHICH CONNECTION(S) WILL BE MADE. CONTRACTOR SHALL INCLUDE FIELD MEASUREMENTS ON SHOP DRAWINGS.

11. THE CONTRACTOR SHALL NOTIFY THE OWNER AND ENGINEER IN WRITING IMMEDIATELY IF CONFLICTS BETWEEN THE DRAWINGS AND ACTUAL CONDITIONS ARE DISCOVERED. THE CONTRACTOR SHALL ACCURATELY RECORD ANY SUCH CONFLICTS ON THE RECORD DRAWINGS.

12. ANY PROPERTY CORNERS, MONUMENTS, OR BENCH MARKS WITHIN THE PROJECT AREA SHALL BE PROTECTED UNLESS OTHERWISE INDICATED FOR DEMOLITION. IF ANY SUCH ITEMS ARE IN DANGER OF DAMAGE OR HAVE BEEN DAMAGED, THE CONTRACTOR SHALL NOTIFY THE OWNER AND THE ENGINEER IMMEDIATELY AND REPLACE/RESTORE THESE ITEMS AT NO ADDITIONAL COST TO THE OWNER. IF OWNER CHOOSES TO SELF PERFORM THE WORK OR INCURS RELATED EXPENSES, THE CONTRACTOR SHALL REIMBURSE THE OWNER FOR ALL COSTS ASSOCIATED WITH THE EFFORT.

UTILITY COORDINATION

13. THE CONTRACTOR SHALL NOTIFY ALL UTILITIES NEAR THE PROJECT AREA AT LEAST 48 HOURS PRIOR TO CONSTRUCTION. THIS SHALL INCLUDE NOTIFYING "SUNSHINE STATE ONE CALL OF FLORIDA" AT LEAST 48 HOURS PRIOR TO ANY DIGGING WORK TO HAVE ALL EXISTING UTILITIES LOCATED. THE PHONE NUMBER IS 1-800-432-4770 AND THE WEB SITE IS WWW.SUNSHINE811.COM.

14. THE CONTRACTOR SHALL PRESERVE AND MAINTAIN EXISTING UTILITIES, STRUCTURES, AND OTHER FEATURES WITHIN THE PROJECT AREA. ANY DAMAGE SHALL BE REPAIRED BY AND AT THE EXPENSE OF THE CONTRACTOR TO THE SATISFACTION OF THE OWNER.

15. THE CONTRACTOR IS RESPONSIBLE FOR BRACING, SHORING, OR PROVIDING OTHER MEANS NECESSARY TO PROTECT AND SUPPORT EXISTING UTILITIES, STRUCTURES, AND OTHER FEATURES (EXPOSED OR UNEXPOSED) THAT MAY BE IMPACTED BY HIS WORK.

SAFETY

16. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO BECOME FAMILIAR WITH THE OSHA EXCAVATION SAFETY STANDARDS AND TO ABIDE BY THEM AS COVERED UNDER THE FLORIDA TRENCH SAFETY ACT.

17. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR CONSTRUCTION SAFETY.

RESTORATION

18. ALL PAVING, STABILIZED EARTH, DRIVEWAYS, CURBS, SIDEWALKS, FENCES, SOD, LANDSCAPING, CULVERTS, ETC. DISTURBED BY CONSTRUCTION ACTIVITIES SHALL BE RESTORED BY AND AT THE EXPENSE OF THE CONTRACTOR TO EXISTING CONDITION OR BETTER.

ACCESS/MAINTENANCE OF FACILITIES

19. THE CONTRACTOR SHALL PROVIDE ACCESS TO ALL EXISTING UTILITIES/FACILITIES AND MAINTAIN UNINTERRUPTED SERVICES THROUGHOUT THE CONTRACT PERIOD.

20. THE CONTRACTOR SHALL MAINTAIN FLOW THROUGH THE WWTF HEADWORKS FOR THE DURATION OF THE PROJECT. ACCESS TO THE HEADWORKS SHALL BE MAINTAINED AT ALL TIMES. ACCESS SHALL BE MAINTAINED BY TEMPORARY STAIRWAY. LADDERS SHALL NOT BE USED TO MAINTAIN ACCESS.

PIPING NOTES

21. SIZE OF FITTINGS SHOWN ON PLANS SHALL CORRESPOND TO THE ADJACENT STRAIGHT RUN OF PIPE UNLESS NOTED OTHERWISE. TYPE OF JOINT AND FITTING MATERIAL SHALL BE AS SPECIFIED FOR THE ADJACENT STRAIGHT RUN OF PIPE UNLESS NOTED OTHERWISE.

22. PIPE HANGERS AND SUPPORTS ARE NOT SHOWN UNLESS A SPECIAL TYPE OR CONFIGURATION IS REQUIRED. FINAL SUPPORTS, LOCATIONS, AND TYPES SHALL BE DETERMINED BY THE CONTRACTOR AND INCLUDED IN THE PIPELINE DRAWING SUBMITTALS FOR REVIEW AND APPROVAL BY THE ENGINEER PRIOR TO INSTALLATION. MAXIMUM SPACING SHALL BE AS SPECIFIED.

COATINGS

23. CONCRETE SURFACES SHALL BE COATED WHERE INDICATED IN ACCORDANCE WITH SECTION 09900, PAINTING AND COATING. COLOR TO MATCH EXISTING.

24. EXPOSED PIPING SHALL BE COATED IN ACCORDANCE WITH SECTION 09900, PAINTING AND COATING. PIPING SHALL BE COLOR CODED TO MATCH EXISTING WWTF COLOR CODING.

ORGANIZATION	CONTACT AND TITLE	ADDRESS	TELEPHONE NUMBER
CITY OF VENICE	TONY WIERZBICKI UTILITIES PROJECT MANAGER	3510 E. LAUREL ROAD NOKOMIS, FL 34275	941-486-2788

BID SET

DOUGLAS ROY YOUNG LICENSE No. 44204 STATE OF FLORIDA PROFESSIONAL ENGINEER

LTR.	DATE	REVISIONS	BY	APPRD.

DESIGNED DYOUNG
DRAWN JKRAMER
CHECKED JBANKS

JonesEdmunds
CERTIFICATE OF AUTHORIZATION #1841
730 NE WALDO ROAD, GAINESVILLE, FLORIDA 32641 / (352) 377-5821
7230 KYLE COURT, SARASOTA, FLORIDA 34240 (941) 358-1440

EASTSIDE WATER RECLAMATION FACILITY
LS FORCE MAIN RELOCATION PROJECT
CITY OF VENICE, FLORIDA

GENERAL NOTES

THIS ITEM HAS BEEN DIGITALLY SIGNED AND SEALED BY DOUGLAS ROY YOUNG, PE, LICENSE NO. 44204, ON FEBRUARY 12, 2018.

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DATE FEB. 2018
PROJECT NO. 22120-002-01
SCALE NONE
DWG. NO. G4

CIVIL LEGEND

- 90 — CONTOUR
- RIGHT-OF-WAY BOUNDARY
- PROPERTY BOUNDARY
- CENTERLINE
- SF — SILT FENCE
- DEMO HATCH
- X — FENCE
- OHE — OVERHEAD ELECTRIC
- UGE — UNDERGROUND ELECTRIC
- UGW — UNDERGROUND WATER MAIN
- STS — STORM SEWER
- UGTV — UNDERGROUND CABLE TELEVISION
- UGT — UNDERGROUND TELEPHONE
- GAS — GAS MAIN
- SAN — GRAVITY SANITARY SEWER
- FM — SANITARY FORCE MAIN
- SS — SANITARY SEWER MANHOLE
- SW — STORM WATER MANHOLE
- +100.00 — SPOT ELEVATION
- COORDINATE POINT
- BOLLARD
- TESTHOLE
- ASPHALT PAVEMENT RESTORATION
- CONCRETE
- GRAVEL
- LIMEROCK
- COMPACTED SOIL
- TO BE DEMOLISHED
- TO BE REMOVED AND RELOCATED

NOTE:
EXISTING PIPE AND EQUIPMENT ARE SHOWN IN THE DRAWINGS AS LIGHT-LINED AND/OR SCREENED. PROPOSED PIPE AND EQUIPMENT ARE SHOWN IN THE DRAWINGS AS HEAVY-LINED. ABOVE GRADE PIPE AND EQUIPMENT ARE SHOWN IN DRAWINGS AS SOLID-LINED. BELOW GRADE PIPE AND EQUIPMENT ARE SHOWN IN DRAWINGS AS DASHED-LINED. SEE BELOW EXAMPLES:

OR — EXISTING PIPE (ABOVE GRADE)

OR — NEW PIPE (BELOW GRADE)

MECHANICAL LEGEND

PIPING SYMBOLS

DOUBLE LINE	SINGLE LINE	
		PIPE
		WELDED PIPE
		FLANGED JOINT
		MECHANICAL JOINT OR RESTRAINED PUSH-ON JOINT
		FLEXIBLE COUPLING ADAPTER
		EXPANSION JOINT
		HUB & SPIGOT JOINT
		BALL JOINT
		FLANGED COUPLING ADAPTER W/ THRUST TIES
		FLEXIBLE COUPLING WITH THRUST TIES
		BLIND FLANGE
		ELBOW UP
		ELBOW DOWN
		TEE UP
		TEE DOWN
		FEMALE QUICK DISCONNECT FITTING
		MALE QUICK DISCONNECT FITTING

DOUBLE LINE	SINGLE LINE	
		LATERAL UP
		LATERAL DOWN
		CONCENTRIC REDUCER
		ECCENTRIC REDUCER
		UNION
		CAP
		ANCHOR
		WYE
		TEE
		CROSS
		ELBOW, 90 DEGREE
		ELBOW, 45 DEGREE
		ELBOW, 22.5 DEGREE
		ABANDON IN PLACE
		DEMOLISH AND REMOVE

VALVE SYMBOLS

- GATE
- BUTTERFLY
- BALL
- CHECK
- DIAPHRAGM
- NEEDLE
- PRESSURE RELIEF
- AIR RELEASE AND/OR VACUUM RELIEF
- REGULATED SIDE
- HYDRAULIC CONTROL VALVE
- PLUG

ACTUATOR SYMBOLS

- M XX — ELECTRIC MOTOR
- EH XX — ELECTROHYDRAULIC
- P XX — PNEUMATIC
- H XX — HYDRAULIC
- S — SOLENOID
- MANUAL

NOTE:
ON LOSS OF PRIMARY POWER (PNEUMATIC, ELECTRICAL OR HYDRAULIC)
XX: FO = FAIL OPEN
FC = FAIL CLOSED
FLP = FAIL TO LAST POSITION

PIPE SUPPORT SYMBOLS

- FLANGED PIPE SUPPORT
- U-SHAPED PIPE SUPPORT
- PIPE SUPPORT W/ AXIAL LOAD SUPPORT

PIPING DESIGNATION

EXAMPLE:

FM-1 — 16"

12" FM-1

- PIPE USE – SEE PIPE SCHEDULE
- NOMINAL PIPE DIAMETER

VALVE DESIGNATION

EXAMPLE:

16V200

- VALVE TYPE – SEE SPECIFICATIONS
- VALVE DESIGNATOR
- NOMINAL VALVE DIAMETER

EQUIPMENT DESIGNATION

EXAMPLE:

40P-1

- CONSECUTIVE IDENTIFIER – SEE INSTRUMENTATION & CONTROL DRAWINGS
- EQUIPMENT DESIGNATION – SEE INSTRUMENTATION & CONTROL DRAWINGS
- UNIT PROCESS – SEE INSTRUMENTATION & CONTROL DRAWINGS

PIPE SCHEDULE

ABBREVIATION	FLOW STREAM IDENTIFICATION	PIPE/DUCT MATERIAL	PIPE MATERIAL ABBREV	SPECIFICATION NUMBER	PIPE LINING	NORMAL MAX OPERATING PRESSURE (PSIG)	FIELD TEST PRESSURE (PSIG)	EXPOSED PIPE PAINT SYSTEM	COLOR CODE	SPECIFIC NOTES
FM-1	FORCE MAIN	DUCTILE IRON	DI	15155	PROTECTO 401	80	100	10	–	A

SPECIFIC NOTES:

A. RESTRAIN ALL JOINTS INCLUDING NEW TO EXISTING.

GENERAL NOTES:

1. COAT EXPOSED AND ABOVE GRADE PIPE PER SPECIFICATION SECTION 09900.
2. TEST LINE PER SECTION 15144 UNLESS SPECIFIED AND/OR NOTED OTHERWISE.

DOUGLAS ROY YOUNG LICENSE No. 44204 STATE OF FLORIDA PROFESSIONAL ENGINEER

BID SET

LTR.	DATE	REVISIONS	BY	APPRD.

DESIGNED DYOUNG
DRAWN JKRAMER
CHECKED JBANKS

JonesEdmunds
CERTIFICATE OF AUTHORIZATION #1841
730 NE WALDO ROAD, GAINESVILLE, FLORIDA 32641 / (352) 377-5821
7230 KYLE COURT, SARASOTA, FLORIDA 34240 (941) 358-1440

EASTSIDE WATER RECLAMATION FACILITY
LS FORCE MAIN RELOCATION PROJECT
CITY OF VENICE, FLORIDA

LEGENDS AND PIPE SCHEDULE

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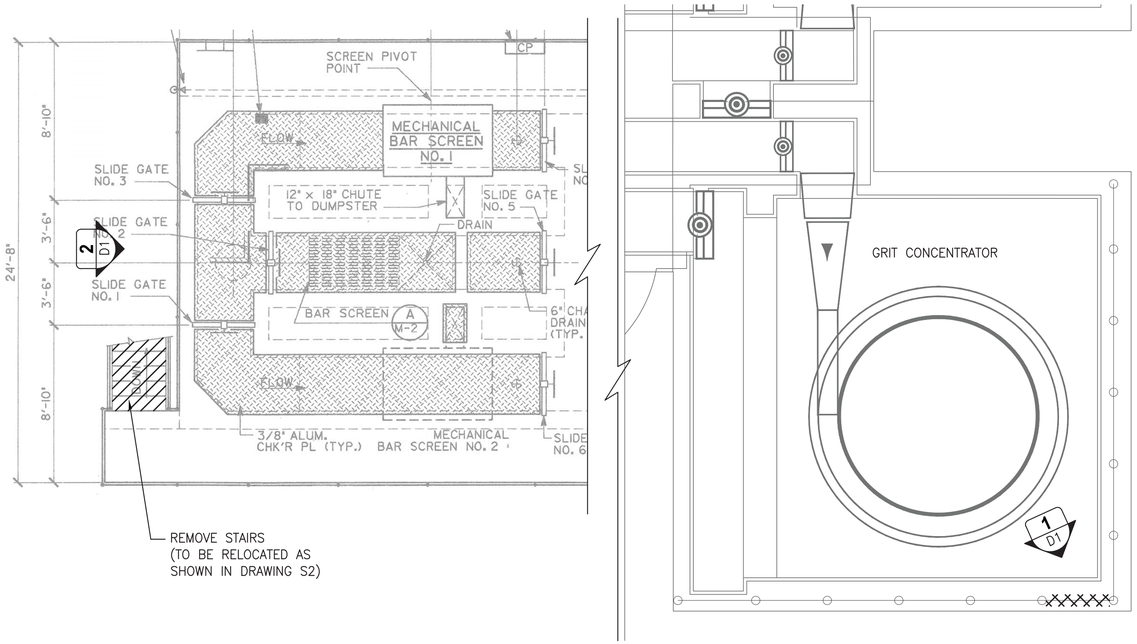
DATE	PROJECT NO.
FEB. 2018	22120-002-01
SCALE	DWG. NO.
NONE	G5

PLOT DATE: 2/12/2018 01:25 PM JOHN KRAMER

GRAPHIC SCALE

0 1 2 4 8

SCALE IN FEET

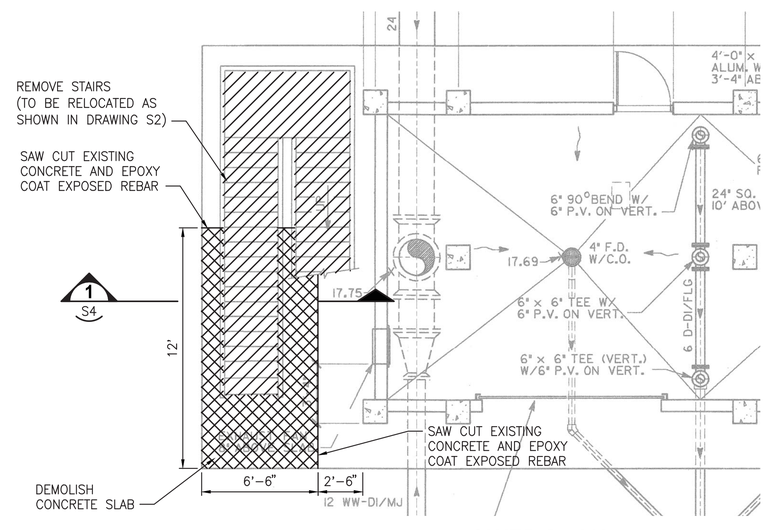


TOP PLAN

1/4" = 1'-0"

DEMOLITION DETAIL 1/D1

NTS



LOWER PLAN

1/4" = 1'-0"

DEMOLITION DETAIL 2/D1

NTS

NOTES:

1. HEADWORKS MUST REMAIN IN SERVICE. PROVIDE TEMPORARY HEADWORKS ACCESS PRIOR TO DEMOLITION. TEMPORARY ACCESS TO REMAIN THROUGHOUT THE PROJECT UNTIL RELOCATION OF PERMANENT STAIRS.
2. COORDINATE LOCATION OF TEMPORARY ACCESS WITH WRF OPERATIONS STAFF.

DOUGLAS ROY YOUNG LICENSE No. 44204 STATE OF FLORIDA PROFESSIONAL ENGINEER

BID SET

LTR.	DATE	REVISIONS	BY	APPRD.

DESIGNED DYOUNG
DRAWN JKRAMER
CHECKED JBANKS

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EASTSIDE WATER RECLAMATION FACILITY
LS FORCE MAIN RELOCATION PROJECT
CITY OF VENICE, FLORIDA

DEMOLITION PLANS

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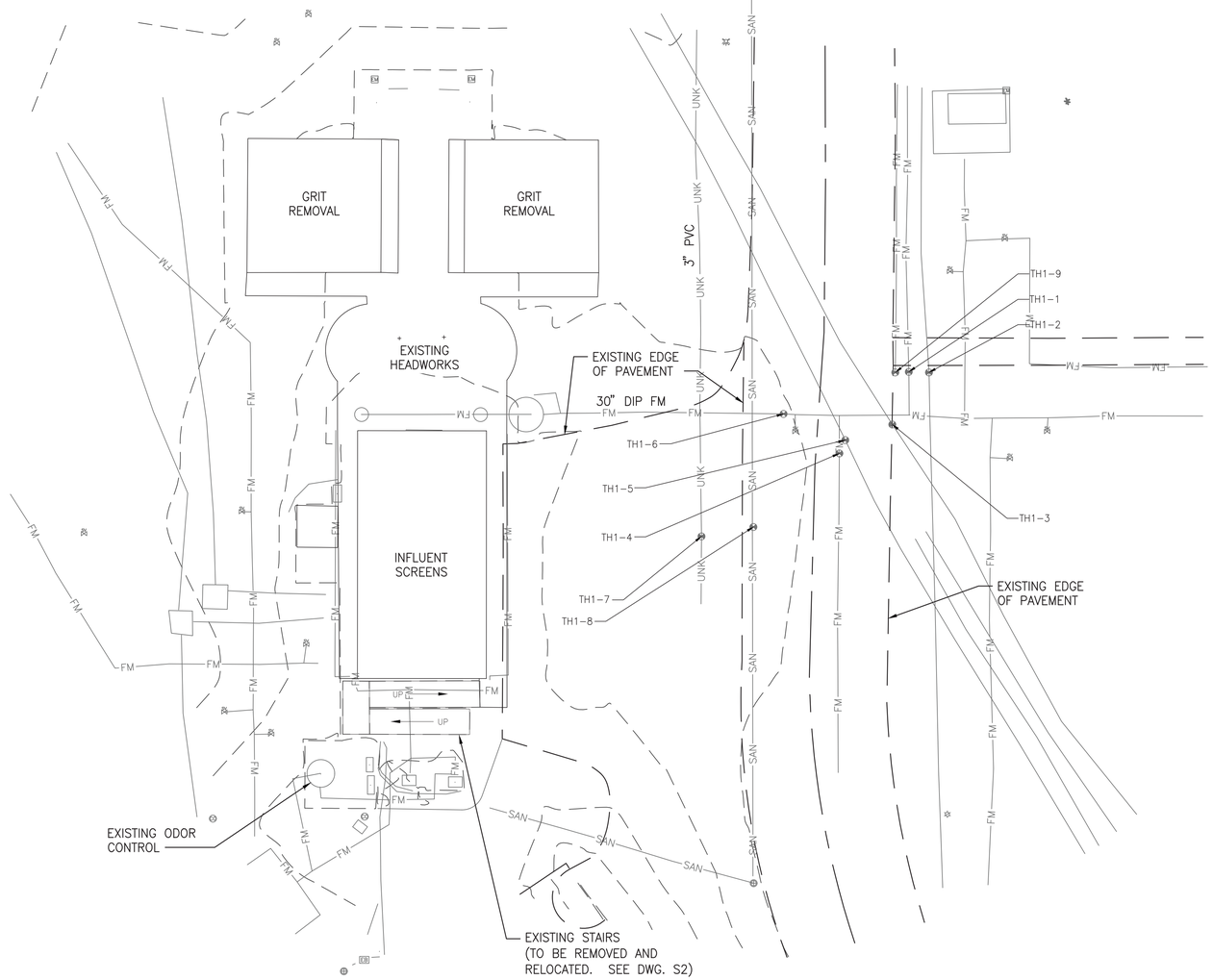
DATE FEB. 2018
PROJECT NO. 22120-002-01
SCALE AS NOTED
DWG. NO. D1

LAST SAVED: 12/4/2017 11:21 AM RWADE DWG LOCATION:\\TPA-MAIN\DRAFTING\22120 CITY OF VENICE\002-01 ERWF PLANT LS FM RELOCATE\CONTRACT DRAWINGS\DEMOLITION\22120002-D01.DWG

PLOT DATE: 2/12/2018 01:25 PM JOHN KRAMER



GRAPHIC SCALE

0 5 10 20

SCALE IN FEET

N

TESTHOLE DESCRIPTIONS
TH1-1, 24" DIP FM, C=3.69'
TH1-2, 6" DIP WM, C=3.82'
TH1-3, 8' X 1.50' CONC. CAP BE (NE EDGE), C=3.30' BOTTOM, C=1.75' TOP
TH1-4, 24" POSSIBLE DIP FM, C=5.06'
TH1-5, 8' X 2.55' CONC. CAP BE (SW EDGE), C=4.65' BOTTOM, C=2.10' TOP
TH1-6, 30" DIP FM, C=5.06'
TH1-7, 3" PVC UNKNOWN, C=3.80'
TH1-8, POSSIBLE 12" PVC SAN, C=9.20'
TH1-9, POSSIBLE 12" DIP FM, C=6.02'

BID SET

DOUGLAS ROY YOUNG LICENSE No. 44204 STATE OF FLORIDA PROFESSIONAL ENGINEER

LAST SAVED: 11/7/2017 10:27 AM JKRAMER DWG LOCATION:\\TPA-MAIN\DRAFTING\22120 CITY OF VENICE\002-01 ERWF PLANT LS FM RELOCATE\CONTRACT DRAWINGS\CIVIL\22120002-C01.DWG

LTR.	DATE	REVISIONS	BY	APPRD.

DESIGNED DYOUNG
DRAWN JKRAMER
CHECKED JBANKS

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CERTIFICATE OF AUTHORIZATION #1841
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7230 KYLE COURT, SARASOTA, FLORIDA 34240 (941) 358-1440

EASTSIDE WATER RECLAMATION FACILITY
LS FORCE MAIN RELOCATION PROJECT
CITY OF VENICE, FLORIDA

EXISTING SITE PLAN

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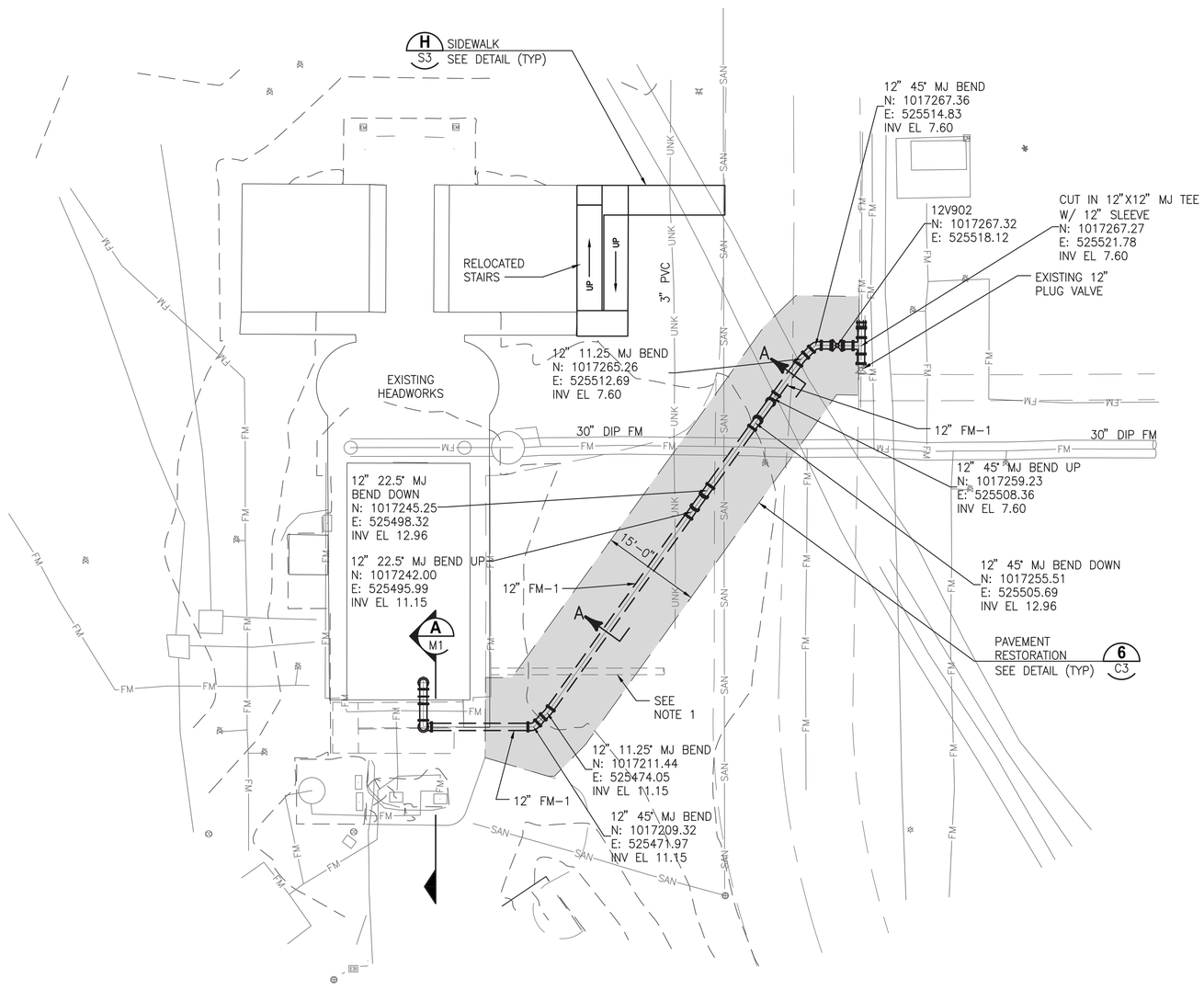
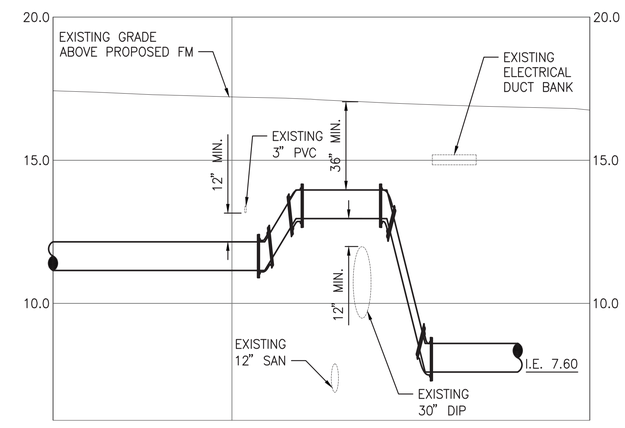
DATE	PROJECT NO.
FEB. 2018	22120-002-01
SCALE	DWG. NO.
NONE	C1

GRAPHIC SCALE
0 5 10 20
SCALE IN FEET
N





SECTION A-A

NOTE:
1. POSSIBLE EXISTING 12" DIP. PIPE NOT FOUND BY SUE. PIPE IS NOT IN SERVICE AND MAY BE CUT IF IN CONFLICT WITH NEW PIPE.

DOUGLAS ROY YOUNG
LICENSE
No. 44204
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

BID SET

LTR.	DATE	REVISIONS	BY	APPRD.

DESIGNED DYOUNG
DRAWN JKRAMER
CHECKED JBANKS

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CERTIFICATE OF AUTHORIZATION #1841
730 NE WALDO ROAD, GAINESVILLE, FLORIDA 32641 / (352) 377-5821
7230 KYLE COURT, SARASOTA, FLORIDA 34240 (941) 358-1440

EASTSIDE WATER RECLAMATION FACILITY
LS FORCE MAIN RELOCATION PROJECT
CITY OF VENICE, FLORIDA

PROPOSED SITE AND
YARD PIPING PLAN

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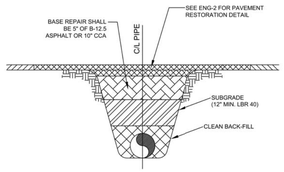
DATE	PROJECT NO.
FEB. 2018	22120-002-01
SCALE	DWG. NO.
AS NOTED	C2



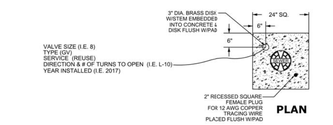
MARKING TAPE AND MESSAGES		
PIPE	TAPE COLOR	MESSAGE
PVC STORM WATER	WHITE	CAUTION STORM WATER OR STORM DRAIN BELOW
PoTABLE WATER MAIN	BLUE	CAUTION POTABLE WATER MAIN BELOW
REUSE WATER MAIN	PURPLE	CAUTION REUSE WATER MAIN BELOW
SEWER FORCE MAIN	GREEN	CAUTION SEWER FORCE MAIN BELOW
SEWER & SERVICE LATERALS	GREEN	CAUTION SEWER MAIN BELOW

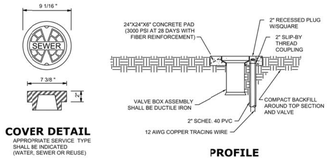
1.) COPPERHEAD TRACING WIRE #12 AWG OR EQUAL SHALL BE ATTACHED TO TOP OF PIPE AT 20' INTERVALS ON ALL RECLAIMED WATER, FORCE, OR POTABLE WATER MAINS. IT SHALL BE COLOR CODED TO REFLECT WHAT THE PIPE CARRIES. (BLUE = WATER, GREEN = SEWER, PURPLE = REUSE).
2.) MINIMUM COVER SHALL BE 36" FROM TOP OF PIPE TO FINISHED GRADE. MAXIMUM COVER SHALL BE 42" FROM FINISHED GRADE UNLESS OTHERWISE APPROVED.
3.) INSTALLATION OF PIPE SHALL BE IN CONFORMANCE WITH MANUFACTURER'S RECOMMENDATIONS.
4.) PAVEMENT RESTORATION SHALL CONFORM WITH DETAIL ENG-2 OF THESE CITY STANDARDS.
5.) CONFLICTS - UTILIZE 45° BENDS WITH SEPARATION AS PER CITY DETAILS.
6.) ALL UTILITIES (PUBLIC & PRIVATE) THAT CROSS A DITCH/SWALE SHALL BE 36" MIN. BELOW THE ACTUAL/DESIGN BOTTOM OF CONVEYANCE.

PIPE TRENCH DETAIL
N.T.S.

CITY OF VENICE ENGINEERING DEPARTMENT 401 WEST VENICE AVE. VENICE FL 34285 (941) 486-2626 FAX (941) 480-3031	UTILITIES - GENERAL	DATE JAN. 2018
	UTILITY PIPE TRENCH	SHEET NO. U-1

PIPE TRENCH DETAIL 1
NTS



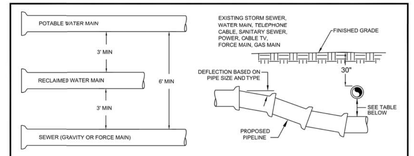


1.) PAVED AREAS: SET CONCRETE PAD AND COVER FLUSH WITH FINISHED PAVEMENT SURFACE.
2.) UNPAVED AREAS: SET PAD AND COVER 1 INCH ABOVE FINISHED GRADE.
3.) VALVES LOCATED IN DITCH AND OVER 4' DEPTH (LINE) MUST USE TRENCH ADAPTER VALVE BOX (AMERICAN FLOW CONTROL).
4.) COPPERHEAD TRACING WIRE #12 AWG OR EQUAL SHALL BE USED. IT SHALL BE COLOR CODED TO REFLECT WHAT THE PIPE CARRIES. (BLUE = WATER, GREEN = SEWER, PURPLE = REUSE)
5.) PRE-CAST PADS MAY BE USED WITH CITY APPROVAL.
6.) FOR CURBED ROADWAYS: CURB SHALL BE ETCHED WITH THE LETTER "V" DIRECTLY PERPENDICULAR TO THE VALVE BOX.

VALVE BOX DETAIL
N.T.S.

CITY OF VENICE ENGINEERING DEPARTMENT 401 WEST VENICE AVE. VENICE FL 34285 (941) 486-2626 FAX (941) 480-3031	UTILITIES - GENERAL	DATE JAN. 2018
	VALVE BOX	SHEET NO. U-4

VALVE BOX DETAIL 2
NTS



MINIMUM HORIZONTAL SEPARATION DISTANCES (FT)
(OUTSIDE OF PIPELINE TO OUTSIDE OF PIPELINE)

	WATER MAIN	FORCE MAIN	SANITARY SERVICE	REUSE MAIN	STORM WATER	OTHER UTILITIES (TELEPHONE, CABLE, ETC.)
WATER MAIN	3	6	6	3	3	3
FORCE MAIN	6	3	3	3	3	3
SANITARY SEWER	6	3	3	3	3	3
REUSE MAIN	3	3	3	3	3	3
STORM WATER	3	3	3	3	3	3
OTHER UTILITIES	3	3	3	3	3	3

MINIMUM VERTICAL SEPARATION DISTANCES (IN)
(OUTSIDE OF PIPELINE TO OUTSIDE OF PIPELINE)

	WATER MAIN	FORCE MAIN	SANITARY SERVICE	REUSE MAIN	STORM WATER	OTHER UTILITIES (TELEPHONE, CABLE, ETC.)
WATER MAIN	6	12	12	6	6	6
FORCE MAIN	12	6	6	6	6	6
SANITARY SEWER	12	6	6	6	6	6
REUSE MAIN	6	6	6	6	6	6
S^ORM WATER	6	6	6	6	6	6
OTHER UTILITIES	6	6	6	6	6	6

1.) MAXIMUM JOINT DEFLECTION SHALL BE 90% OF MANUFACTURER'S RECOMMENDATION.
2.) WHEREVER POSSIBLE, THE LAYOUT OF UTILITIES SHALL PLACE SANITARY SEWER AND SEWER FORCE MAINS BELOW RECLAIMED WAINS AND BELOW WATER MAINS, RESPECTIVELY. WHERE WATER MAINS ARE ABOVE GRAVITY SEWERS OR WASTEWATER FORCE MAINS, A VERTICAL CLEARANCE OF 6 INCHES IS ACCEPTABLE.
3.) ACCEPTABLE VARIANCES:
A. WHERE HORIZONTAL SEPARATION CANNOT BE MAINTAINED, C900 DR14 PVC PIPE SHALL BE USED FOR ONE OF THE PIHELINES.
B. WHERE VERTICAL CLEARANCE CANNOT BE MAINTAINED, ONE FULL ;ENGTH OF DR14 C900 PIPE SHALL BE INSTAL_ED CENTERED AT THE POINT OF CROSSING.
C. WHERE 36" MINIMUM DEPTH OF COVER CANNOT BE MAINTAINED, SPECIAL PROTECTION OR PIPE MATERIAL UPGRAJE MAY BE REQUIRED, AT THE DISCRETION OF THE UTILITY DEPARTMENT.
4.) NO WATER PIPE SHALL PASS THROUGH, OR COME IN CONTACT WITH ANY PART OF A SANITARY MANHOLE OR STORMWATER STRUCTURE.

UTILITY CONFLICT & SEPARATION DETAIL
N.T.S.

CITY OF VENICE ENGINEERING DEPARTMENT 401 WEST VENICE AVE. VENICE FL 34285 (941) 486-2626 FAX (941) 480-3031	UTILITIES - GENERAL	DATE JAN. 2018
	UTILITY CONFLICTS & SEPARATIONS	SHEET NO. U-5

UTILITY CONFLICT & SEPARATION DETAIL 3
NTS

MINIMUM LENGTH (FT) OF FORCE MAIN TO BE RESTRAINED ON EACH SIDE OF FITTING									
FITTING	PIPE SIZE (INCHES) 4	6	8	10	12	16	18	20	24
45 BEND: H	6	9	12	14	16	21	23	25	29
VU	4	6	7	9	10	13	15	16	19
VD	12	20	26	32	37	48	53	28	68
22.5 BEND: H	3	4	6	7	8	10	11	12	14
VU	2	3	4	4	5	6	7	8	9
VD	7	10	13	15	18	23	26	28	33
11:25 BEND: H	2	2	3	3	4	5	5	6	7

MINIMUM LENGTH (FT) OF WATER OR REUSE MAIN TO BE RESTRAINED ON EACH SIDE OF FITTING									
FITTING	PIPE SIZE (INCHES) 4	6	8	10	12	16	18	20	24
90 BEND: H	23	33	43	51	60	76	83	90	104
45 BEND: H	10	14	18	21	25	31	34	37	43
VU	6	8	11	13	16	20	22	24	28
VD	22	30	40	48	56	72	80	87	102
22.5 BEND: H	5	7	8	10	12	15	17	18	21
VU	3	4	5	6	7	10	11	12	14
VD	10	15	19	23	27	35	38	42	49
1:.25 BEND: H	2	3	4	5	6	7	8	9	10
PLUGS:	52	73	96	115	136	174	193	211	246

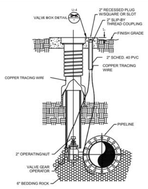
ABBREVIATIONS: H=HORIZONTAL, VU=VERTICAL UP, VD=VERTICAL DOWN.

1.) FOR TEE OR REDUCER FITTINGS SUBMIT RESTRAINED JOINT LENGTH CALCULATIONS TO CITY ENGINEER FOR REVIEW AND APPROVAL, USING THE ASSUMPTIONS LISTED ABOVE.
2.) RESTRAINED JOINT LENGTH FOR WATER AND REUSE MAINS BASED ON TEST PRESSURE OF 150 PSI. RESTRAINED JOINT LENGTH FOR FORCE (SEWER) MAINS BASED ON TEST PRESSURE OF 100 PSI. CALCULATIONS WERE MADE USING EBAA IRON SOFTWARE (AVAILABLE AT WWW.EBAA.COM) AND THE FOLLOWING ASSUMPTIONS: GRANULAR MATERIAL (GM) SOIL TYPE, TRENCH TYPE 3, BURY DEPTH OF 3 FT, AND SAFETY FACTOR OF 2 TO 1. IF FIELD CONDITIONS DIFFER FROM ABOVE ASSUMPTIONS EOR SHALL PROVIDE CALCULATIONS BASED ON ACTUAL CONDITIONS.
3.) RESTRAINED JOINT SHALL BE USED ON ALL JOINTS FROM ANY MAIN TEE TO ANY FIRE HYDRANT ASSEMBLY.
4.) THRUST BLOCKS WILL NOT BE ACCEPTED, UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER.

PRESSURE MAIN RESTRAINED JOINT TABLE
N.T.S.

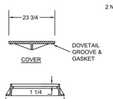
CITY OF VENICE ENGINEERING DEPARTMENT 401 WEST VENICE AVE. VENICE FL 34285 (941) 486-2626 FAX (941) 480-3031	UTILITIES - GENERAL	DATE JAN. 2018
	RESTRAINED JOINT TABLE	SHEET NO. U-7

PRESSURE MAIN RESTRAINED JOINT TABLE 4
NTS



1.) PLUG VALVES SHALL BE MANUFACTURED BY DEZURIK.
2.) SEAT OF PLUG VALVE SHALL BE ON THE UPSTREM SIDE OF THE BODY.
3.) VALVE SHALI BE INSTALLED IN CONFORMANCE WITH MANUFACTURES RECOMMENDATIONS.
4.) ALL SEWER FORCE MAIN PLUG VALVES SHALL BE GEAR OPERATED.

PLUG VALVE DETAIL
(SEWER FORCE MAINS ONLY)
N.T.S.



1.) MATERIAL: ASTM-A48 CLASS 30B GRAY IRON
2.) RING WT: 155 LBS. APP.
3.) COVER WT: 150 LBS. APP.

TYPICAL COVER

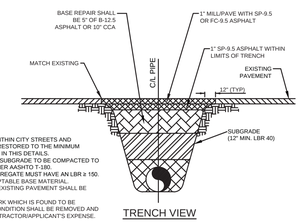
1.) HEAVY DUTY 130 LB. COVER
2.) MANHOLE COVER SHALL BE J.S FOUNDARY TYPE CE-ORS
3.) SHALL BE LABELLED AS LLUSTRATED ABOVE WITH BOTH 'CITY OF VENICE" AND TYPE OF JTILITY (SANITARY, STORM, ETC.)
1.) MATERIAL: ASTM-A48 CLASS 30B GRAY IRON
2.) RING WT: 90 LBS. APP.
3.) COVER WT: 130 LBS. APP.

LOW PROFILE COVER

MANHOLE COVERS DETAIL
(ALL UNITS IN INCHES)
N.T.S.

CITY OF VENICE ENGINEERING DEPARTMENT 401 WEST VENICE AVE. VENICE FL 34285 (941) 486-2626 FAX (941) 480-3031	UTILITIES - SEWER	DATE JAN. 2018
	PLUG VALVE & MANHOLE COVERS	SHEET NO. S-1

PLUG VALVE & MANHOLE COVERS DETAIL 5
NTS



1.) ALL PAVEMENT CUTS WITHIN CITY STREETS AND ALLEYWAYS SHALL BE RESTORED TO THE MINIMUM STANDARDS AS SHOWN IN THIS DETAILS.
2.) TRENCH BACKFILL AND SUBGRADE TO BE COMPACTED TO 98% OF MAX. DENSITY PER AASHTO T-180. CRUSH CONCRETE AGGREGATE MUST HAVE AN LBR ≥ 150. SHELL IS NOT AN ACCEPTABLE BASE MATERIAL.
3.) ALL CONNECTIONS TO EXISTING PAVEMENT SHALL BE STRAIGHT AND FLUSH.
4.) ANY RESTORATION WORK WHICH IS FOUND TO BE UNSATISFACTORY IN CONDITION SHALL BE REMOVED AND REPLACED AT THE CONTRACTOR/APPLICANT'S EXPENSE.

PAVEMENT RESTORATION DETAIL
N.T.S.

PAVEMENT RESTORATION DETAIL 6
NTS

BID SET

DOUGLAS ROY YOUNG LICENSE No. 44204 STATE OF FLORIDA PROFESSIONAL ENGINEER

LTR.	DATE	REVISIONS	BY	APPRD.

DESIGNED DYOUNG
DRAWN JKRAMER
CHECKED JBANKS

JonesEdmunds
CERTIFICATE OF AUTHORIZATION #1841
730 NE WALDO ROAD, GAINESVILLE, FLORIDA 32641 / (352) 377-5821
7230 KYLE COURT, SARASOTA, FLORIDA 34240 (941) 358-1440

EASTSIDE WATER RECLAMATION FACILITY
LS FORCE MAIN RELOCATION PROJECT
CITY OF VENICE, FLORIDA

CIVIL DETAILS

THIS ITEM HAS BEEN DIGITALLY SIGNED AND SEALED BY DOUGLAS ROY YOUNG, PE, LICENSE NO. 44204, ON FEBRUARY 12, 2018.
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DATE	PROJECT NO.
FEB. 2018	22120-002-01
SCALE NONE	DWG. NO. C3

LAST SAVED: 1/29/2018 10:27 AM RWADE DWG LOCATION:\TPA-MAIN\DRAFTING\22120 CITY OF VENICE\002-01 ERWF PLANT LS FM RELOCATE\CONTRACT DRAWINGS\CIVIL\22120002-C03.DWG

GENERAL STRUCTURAL NOTES

GENERAL CONDITIONS

1. ALL STRUCTURAL DRAWINGS SHALL BE USED IN CONJUNCTION WITH THE MECHANICAL, ELECTRICAL, AND SHOP DRAWINGS AND SPECIFICATIONS.
2. THE CONTRACTOR SHALL REVIEW AND VERIFY DIMENSIONS SHOWN IN ALL PLANS AND REVIEW ALL FIELD CONDITIONS THAT MAY AFFECT THE WORK DEPICTED ON THE DRAWINGS. SHOULD DISCREPANCIES APPEAR, THE CONTRACTOR SHALL NOTIFY THE ENGINEER IN WRITING TO OBTAIN ENGINEER'S CLARIFICATION BEFORE COMMENCING WITH THE WORK.
3. FOR ALL ITEMS EMBEDDED IN OR PASSING THROUGH CONCRETE, THE CONTRACTOR SHALL INITIALLY REFER TO MECHANICAL DRAWINGS FOR TYPE, SIZE, LOCATION, AND SPECIAL INSTALLATION REQUIREMENTS FOR THESE ITEMS.
4. THE CONTRACTOR SHALL TAKE ALL NECESSARY MEASURES TO PROTECT EXISTING STRUCTURES FROM DAMAGE WHEN WORKING IN AND AROUND EXISTING STRUCTURES PERFORMING WORK SUCH AS DEMOLITION, FOUNDATION EXCAVATIONS, AND OTHERS.
5. SIZE AND LOCATION OF EQUIPMENT PADS AND ANCHOR BOLTS SHALL BE PER EQUIPMENT MANUFACTURER'S REQUIREMENTS.
6. ANY CONSTRUCTION EQUIPMENT THAT MAY INDUCE VIBRATION TO THE STRUCTURE SHALL BE ADEQUATELY ISOLATED FROM THE STRUCTURE.
7. ALL DETAILS AND SECTIONS SHOWN ON THE DRAWINGS ARE INTENDED TO BE TYPICAL AND SHALL BE CONSTRUED TO APPLY TO ANY SIMILAR SITUATION ELSEWHERE ON THE PROJECT, EXCEPT WHERE A DIFFERENT DETAIL IS SHOWN.
8. STANDARD DETAILS APPLY TO ALL SIMILAR SITUATIONS ON THE PROJECT EXCEPT WHERE A DIFFERENT DETAIL IS SHOWN.

DESIGN CRITERIA

BUILDING CODES AND REFERENCES:

1. 2012 INTERNATIONAL BUILDING CODE (IBC)
2. REINFORCED CONCRETE:

   ACI 318-11 "BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE"
3. ALUMINUM: ADM1-2010, ALUMINUM DESIGN MANUAL
4. LIVE LOADS:

   -PROCESS RELATED STRUCTURES:

WALKWAYS, STAIRWAYS AND LANDINGS:	100 PSF
SLABS ON GRADE	300 PSF

5. WIND DESIGN CRITERIA:

RISK CATEGORY	III
ULTIMATE DESIGN WIND SPEED, V_{ULT}	162 MPH
NOMINAL DESIGN WIND SPEED, V_{ASD}	125 MPH
EXPOSURE CATEGORY	C

FOUNDATIONS

FOUNDATION DESIGN:

1. ALLOWABLE BEARING PRESSURE FOR MAT SLAB: 2,000 PSF

CONCRETE (CAST-IN-PLACE)

1. ALL MATERIALS AND METHODS OF CONSTRUCTION SHALL BE IN ACCORDANCE WITH ACI 318 REQUIREMENTS.
2. ALL CONCRETE SHALL BE AIR-ENTRANED WITH A MINIMUM OF 4,000 PSI COMPRESSIVE STRENGTH AT 28 DAYS UNLESS OTHERWISE NOTED.
3. WATER REDUCING AGENT SHALL BE IN ACCORDANCE WITH ASTM C494.
4. ALL CONCRETE SURFACES EXPOSED TO AIR, UNLESS OTHERWISE NOTED IN THE SPECIFICATIONS, SHALL BE TREATED WITH AN APPROPRIATE CURING COMPOUND AS SOON AS FINISHING IS COMPLETED OR FORMS ARE REMOVED.
5. ALL EXPOSED CORNERS SHALL HAVE A MINIMUM CHAMFER OF 3/4" UNLESS OTHERWISE NOTED.
6. THE CONTRACTOR SHALL OBTAIN ENGINEER'S APPROVAL FOR THE LOCATIONS OF CONSTRUCTION JOINTS THAT ARE NOT SHOWN ON THE DRAWINGS.

REINFORCING STEEL

1. REINFORCEMENT SHALL CONFORM TO ASTM A615, GRADE 60 REQUIREMENTS. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A315 REQUIREMENTS. ALL ACCESSORIES SHALL BE IN CONFORMANCE WITH ACI 315 REQUIREMENTS.
2. REINFORCING STEEL SHALL HAVE THE FOLLOWING CLEAR COVER UNLESS OTHERWISE NOTED:

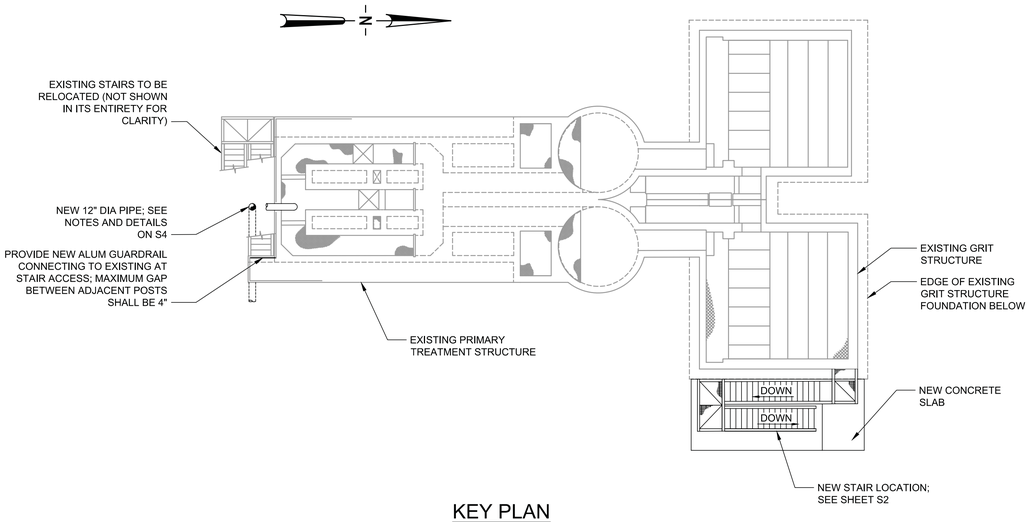
   a. CONCRETE CAST AGAINST EARTH
3. LAP SPLICES SHALL BE AS SHOWN ON THE DRAWINGS. FOR LAP SPLICES NOT SHOWN ON THE DRAWINGS, THE CONTRACTOR SHALL OBTAIN ENGINEERS APPROVAL.
4. THE CONTRACTOR SHALL PREPARE PLACING DRAWINGS AND SCHEDULES IN CONFORMANCE WITH ACI 315 REQUIREMENTS.

ALUMINUM

1. ALUMINUM DESIGN, DETAILING, FABRICATION, AND ERECTION SHALL CONFORM TO THE LATEST EDITION OF THE ALUMINUM DESIGN MANUAL.
2. ALUMINUM IN CONTACT WITH OR EMBEDDED IN CONCRETE OR MASONRY SURFACES SHALL BE COATED WITH A HEAVY COATING OF ALKALI RESISTANT BITUMINOUS PAINT.
3. ALL BOLTS USED IN CONNECTIONS WITH ALUMINUM MEMBERS SHALL BE STAINLESS STEEL A316, UNLESS NOTED OTHERWISE.
4. ALL WELDING OF ALUMINUM STRUCTURES SHALL CONFORM TO "STRUCTURAL WELDING CODE - ALUMINUM", AWS D1.2, LATEST EDITION.

STAINLESS STEEL

1. STAINLESS STEEL BOLTS, NUTS AND WASHERS SHALL BE TYPE 316 IN ACCORDANCE TO ASTM F593 UNLESS NOTED OTHERWISE.



KEY PLAN

N.T.S

STRUCTURAL ABBREVIATIONS

&	AND	EXIST	EXISTING	PCS	PIECES
@	AT	EXP	EXPANSION	PEMB	PRE-ENGINEERED METAL BUILDING
#	NUMBER	FE	FIRE EXTINGUISHER	PERP	PERPENDICULAR
ADDTL	ADDITIONAL	FF	FAR FACE, FINISHED FLOOR	PL	PLATE
ALUM	ALUMINUM			PLF	POUND PER LINEAR FOOT
AEWS	AUTOMATIC END WELDED STUD(S)	FG	FINISHED GRADE		
		FRP	FIBER REINFORCED PLASTIC	PT	PRESSURE TREATED
ALT	ALTERNATE			PROJ	PROJECTION
APROX	APPROXIMATE(LY)	FT	FOOT	PSF	POUNDS PER SQUARE FOOT
BLD	BUILDING	FTG	FOOTING		
BM	BEAM	FV	FIELD VERIFY		
BOT	BOTTOM	GA	GAGE	PSI	POUNDS PER SQUARE INCH
CJ	CONTROL JOINT	GALV	GALVANIZED		
CL	CENTER LINE	HK	HOOK	PVC	POLYVINYL CHLORIDE
CLR	CLEAR	HORIZ	HORIZONTAL	R	RADIUS
CMU	CONCRETE MASONRY UNIT	HSS	HOLLOW STRUCTURAL SECTION	REINF	REINFORCING
				REQD	REQUIRED
COL	COLUMN	HP	HIGH POINT	RO	ROUGH OPENING
CONC	CONCRETE	ID	INSIDE DIAMETER	SCHED	SCHEDULE(D)
CONN	CONNECTION	JT	JOINT	SIM	SIMILAR
CONST JT	CONSTRUCTION JOINT	LB(S)	POUND(S)	SJ	SAWCUT JOINT
CONT	CONTINUOUS	LONG	LONGITUDINAL	SMS	SHEET METAL SCREW
DIA	DIAMETER	LP	LOW POINT	SPECS	SPECIFICATIONS
DIM	DIMENSION	MANUF	MANUFACTURER	SQ	SQUARE
DEG	DEGREE(S)	MATL	MATERIAL	SS	STAINLESS STEEL
DO	DITTO	MAX	MAXIMUM	STD	STANDARD
DWG	DRAWING	MECH	MECHANICAL	STL	STEEL
DWL	DOWEL(S)	MFR	MANUFACTURER	T/	TOP OF
(E)	EXISTING	MIN	MINIMUM	TB	TIE BEAM
EA	EACH	MISC	MISCELLANEOUS	T&B	TOP AND BOTTOM
EF	EACH FACE	MO	MASONRY OPENING	THK	THICK
EJ	EXPANSION JOINT	MTL	METAL	THRU	THROUGH
EL	ELEVATION	NO	NUMBER	TOC	TOP OF CONCRETE
ELEC	ELECTRICAL	NTS	NOT TO SCALE	TOS	TOP OF STEEL
EMBED	EMBEDMENT	OC	ON CENTER	TYP	TYPICAL
EQ	EQUAL	OD	OUTSIDE DIAMETER	UNO	UNLESS NOTED OTHERWISE
EW	EACH WAY	OH	OPPOSITE HAND		
		OPNG	OPENING	VERT	VERTICAL
				WT	WEIGHT
				WWF	WELDED WIRE FABRIC

NOTE:
1. EXISTING ALUMINUM STAIRS ARE TO BE DISASSEMBLED AND REASSEMBLED AT THE NEW LOCATION; SEE KEY PLAN.

EXISTING ALUMINUM STAIRS LOOKING WEST

PHOTOGRAPH NO. 1

N.T.S

LEGEND

STRUCTURAL LEGEND APPLIES TO "S" SHEETS ONLY

- EARTH FILL
- UNDISTURBED EARTH
- COMPACTED GRANULAR FILL
- GROUT OR SAND (AS NOTED)
- GRATING
- CONCRETE
- EXISTING CONCRETE
- DEMOLITION
- STEEL
- PRECAST CONCRETE

SYMBOLS

SYMBOLS APPLY TO "S" SHEETS ONLY

- 1 — COLUMN OR WALL LINE TAG
- T/SLAB EL.0.00 — ELEVATION TAG
- 00 / S00 — SECTION NO. / BUILDING SECTION INDICATOR / DWG. NO. OF SECTION VIEW
- A / S00 — DETAIL NO. / DETAIL INDICATOR / DWG. NO / INDICATES DETAIL SECTION CUT (WHERE SHOWN)

WEKIVA ENGINEERING
711 N ORANGE AVE, SUITE A
WINTER PARK, FL 32789
P: 321.972.4909 CA Lic. No: 31920

Digitally signed by John Sobczak
DN: c=US, o=IdenTrust ACES Business Representative, ou=WEKIVA ENGINEERING LLC, cn=John Sobczak, 0.9.2342.19200300.100.1.1=A01098000000015CF44C01920000277 1
'Date: 2018.02.12 16:00:17 -05'00'

John Sobczak

JOHN VINCENT SOBCZAK LICENSE No. 71407 STATE OF FLORIDA PROFESSIONAL ENGINEER

BID SET

LTR.	DATE	REVISIONS	BY	APPRD.

DESIGNED JSOBCZAK
DRAWN JSOBCZAK
CHECKED DMORRIS

JonesEdmunds
CERTIFICATE OF AUTHORIZATION #1841
730 NE WALDO ROAD, GAINESVILLE, FLORIDA 32641 / (352) 377-5821
7230 KYLE COURT, SARASOTA, FLORIDA 34240 (941) 358-1440

EASTSIDE WATER RECLAMATION FACILITY
LS FORCE MAIN RELOCATION PROJECT
CITY OF VENICE, FLORIDA

GENERAL NOTES, KEY PLAN, AND PHOTOGRAPH

THIS ITEM HAS BEEN DIGITALLY SIGNED AND SEALED BY JOHN VINCENT SOBCZAK, PE, LICENSE NO. 71407, ON FEBRUARY 12, 2018.

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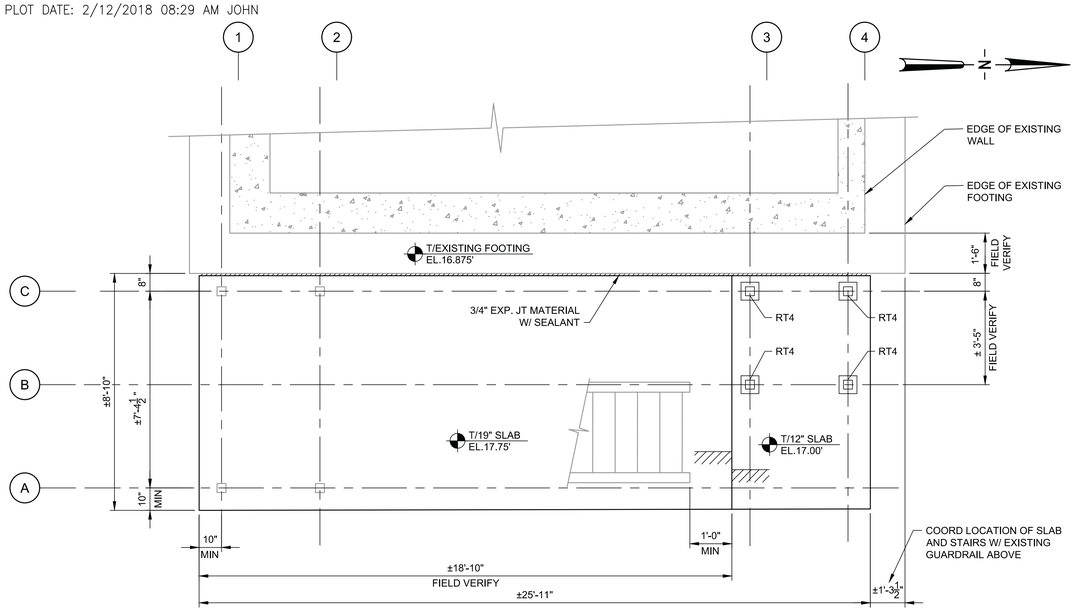
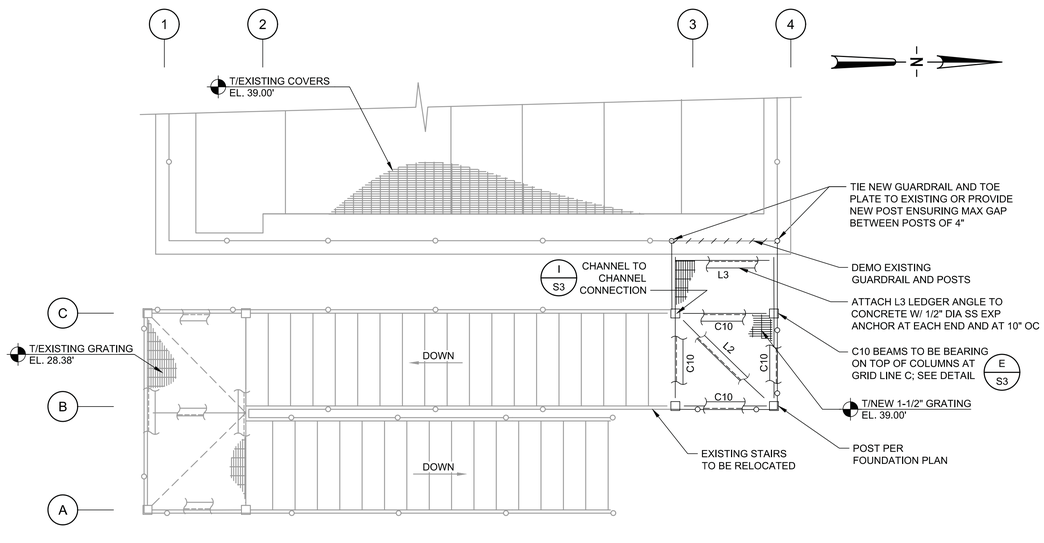
DATE	PROJECT NO.
FEB. 2018	22120-002-01
SCALE	DWG. NO.
AS NOTED	S1



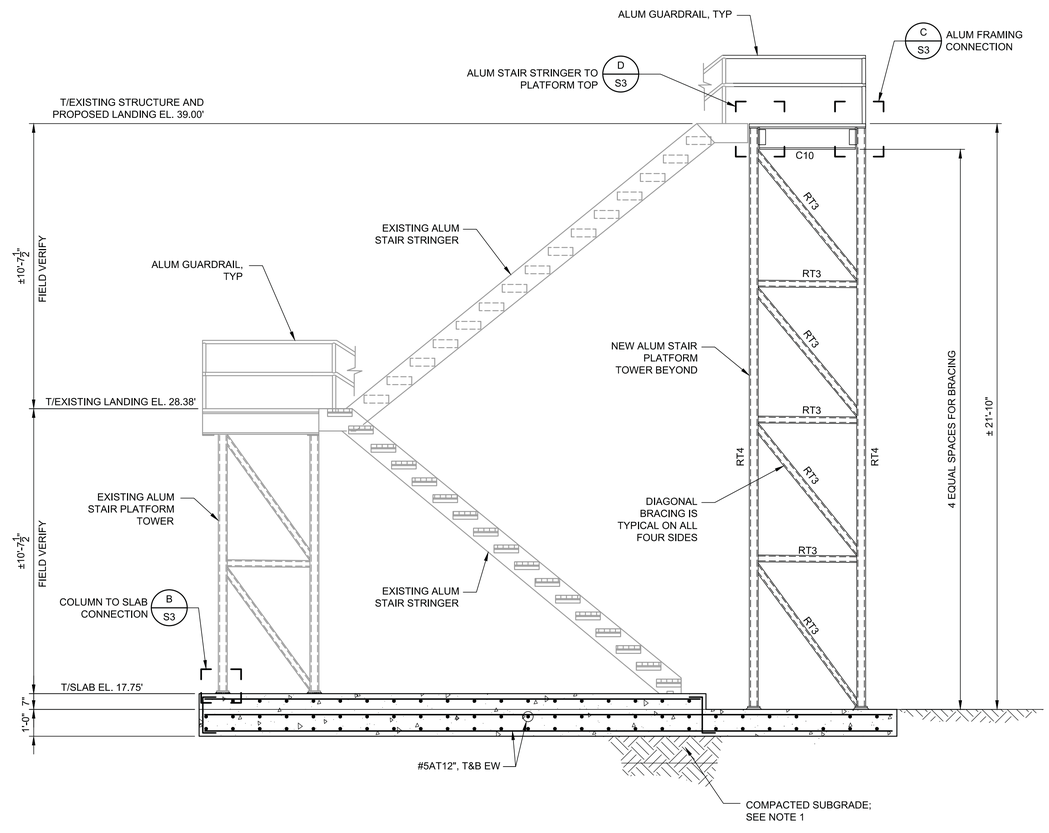
FOUNDATION PLAN

3/8"=1'-0"



T/STRUCTURE PLAN

3/8"=1'-0"



STAIRS AT NEW LOCATION ELEVATION

3/8"=1'-0"

NOTES:

1. ALL FILL SHALL BE CLEAN GRANULAR FILL FREE OF ORGANICS AND DELETERIOUS MATERIAL. FILL SHALL BE PLACED OVER COMPACTED NATIVE SOILS. MINIMUM COMPACTION SHALL BE 95 PERCENT OF MAXIMUM MODIFIED PROCTOR D-1557 DRY DENSITY.

LEGEND: ALUMINUM SHAPES

C10:	C10x8.36
C12:	C12x11.82
RT3:	RT3x3x1/4"
RT4:	RT4x4x1/4"
L3:	L3x3x1/4"
L2:	L2x2x1/4"

BID SET

WEKIVA ENGINEERING
711 N ORANGE AVE, SUITE A
WINTER PARK, FL 32789
P: 321.972.4909 CA Lic. No: 31920

JOHN VINCENT SOBCZAK LICENSE No. 71407 STATE OF FLORIDA PROFESSIONAL ENGINEER

LTR.	DATE	REVISIONS	BY	APPRD.

DESIGNED JSOBCZAK
DRAWN JSOBCZAK
CHECKED DMORRIS

JonesEdmunds
CERTIFICATE OF AUTHORIZATION #1841
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7230 KYLE COURT, SARASOTA, FLORIDA 34240 (941) 358-1440

EASTSIDE WATER RECLAMATION FACILITY
LS FORCE MAIN RELOCATION PROJECT
CITY OF VENICE, FLORIDA

STAIRS PLANS AND SECTION

THIS ITEM HAS BEEN DIGITALLY SIGNED AND SEALED BY JOHN VINCENT SOBCZAK, PE, LICENSE NO. 71407, ON FEBRUARY 12, 2018.

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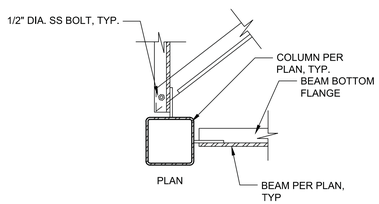
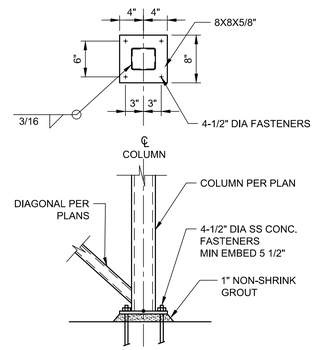
DATE	PROJECT NO.
FEB. 2018	22120-002-01
SCALE	DWG. NO.
AS NOTED	S2



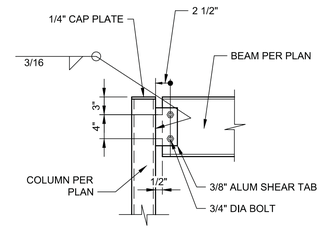
DIAGONAL BRACING CONNECTION

DETAIL A
1"=1'-0"



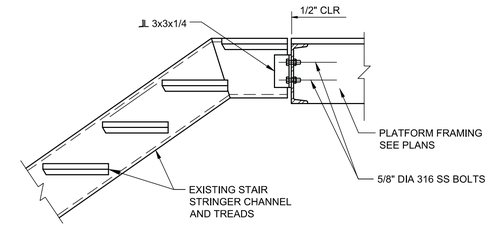
COLUMN TO SLAB CONNECTION

DETAIL B
1"=1'-0"



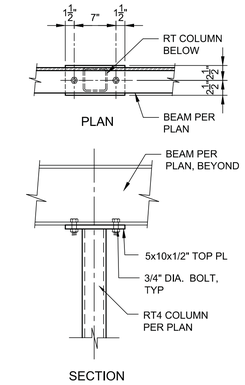
TYPICAL FRAMING CONNECTION

DETAIL C
1"=1'-0"



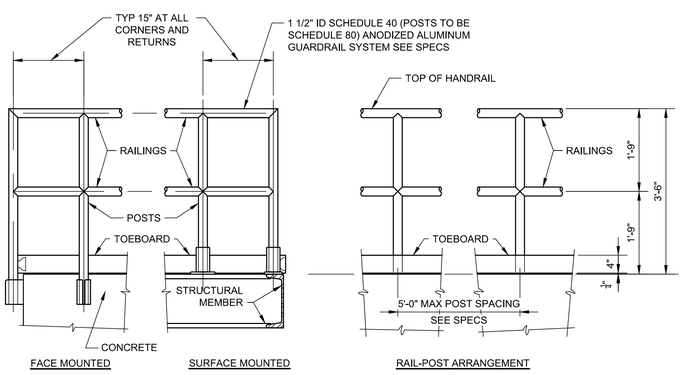
ALUM STAIR STRINGER TO PLATFORM TOP

DETAIL D
NTS



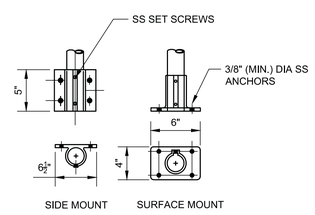
COLUMN TO CANTILEVER BEAM CONNECTION

DETAIL E
NTS



GUARDRAILS

DETAIL F
NTS

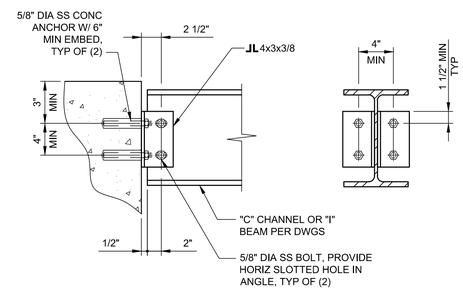


CONNECTIONS

LOCATED AT 30'-0" MAX INTERVALS

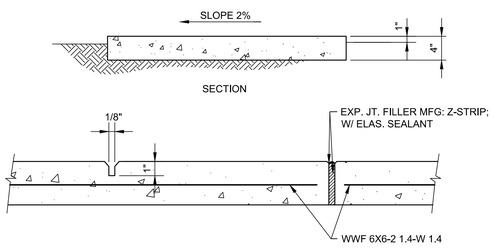
EXPANSION JT

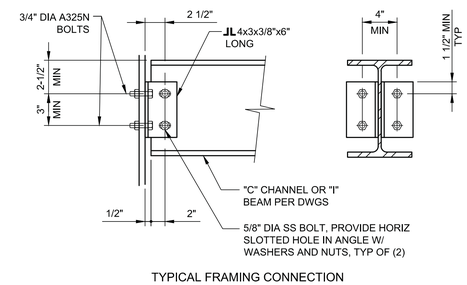
BASE CONNECTION NOTE:
4 ANCHOR PATTERN SHOWN, 2 BOLT PATTERN WILL BE ACCEPTABLE GIVEN THE LOADING REQUIREMENTS SPECIFIED ARE SATISFIED AND A MINIMUM OF 1/2" DIA. SS BOLTS ARE PROVIDED.



TYPICAL FRAMING CONNECTION TO CONCRETE

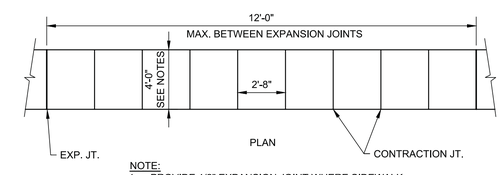
DETAIL G
NTS





TYPICAL FRAMING CONNECTION

DETAIL I
NTS



NOTE:
1. PROVIDE 1/2" EXPANSION JOINT WHERE SIDEWALK ABUTS STRUCTURES OR OTHER SIDEWALKS

SIDEWALK

DETAIL H
NTS

GENERAL ALUMINUM FABRICATIONS NOTES:

1. ALUMINUM EMBEDDED IN CONCRETE MUST BE PAINTED WITH ONE SHOP COAT OF HEAVY BITUMASTIC.
2. ALUMINUM SHAPES IN CONTACT WITH CONCRETE MUST BE SEPARATED BY $\frac{1}{32}$" NEOPRENE GASKET OR ANY CASE WHERE TWO DIFFERENT METALS ARE TO BE IN CONTACT. A NEOPRENE GASKET MUST BE PROVIDED.
3. HANDRAILS, GUARDRAILS, POST, BRACKETS AND MOUNTINGS SHALL MEET THE FLORIDA BUILDING CODE (FBC) AND OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATIONS (OSHA) LOADING REQUIREMENTS.
4. TOP OF ALL GUARDRAILS SHOULD BE 42" HIGH ABOVE THE FINISH FLOOR OR WALKWAY, THE INTERMEDIATE RAILS SHALL BE EQUALLY SPACED BETWEEN THE TOP RAIL AND THE TOEBOARD.
5. ALL WALKWAYS SHALL USE GRATING UNLESS OTHERWISE SHOWN ELSEWHERE ON THE DRAWINGS. GRATING SHALL BE PLACED SUCH THAT OPENINGS AROUND GATES AND OTHER EQUIPMENT IS 2" MINIMUM.
6. HANDRAIL AT GATE LOCATIONS SHALL NOT BE INTERRUPTED AND SHALL BE SPECIFICALLY ADDRESSED IN SHOP DRAWING SUBMITTALS.

BID SET

WEKIVA ENGINEERING
711 N ORANGE AVE, SUITE A
WINTER PARK, FL 32789
P: 321.972.4969 CA Lic. No: 31920

JOHN VINCENT SOBCZAK LICENSE No. 71407 STATE OF FLORIDA PROFESSIONAL ENGINEER

LTR.	DATE	REVISIONS	BY	APPRD.

DESIGNED JSOBCZAK
DRAWN JSOBCZAK
CHECKED DMORRIS

JonesEdmunds
CERTIFICATE OF AUTHORIZATION #1841
730 NE WALDO ROAD, GAINESVILLE, FLORIDA 32641 / (352) 377-5821
7230 KYLE COURT, SARASOTA, FLORIDA 34240 (941) 358-1440

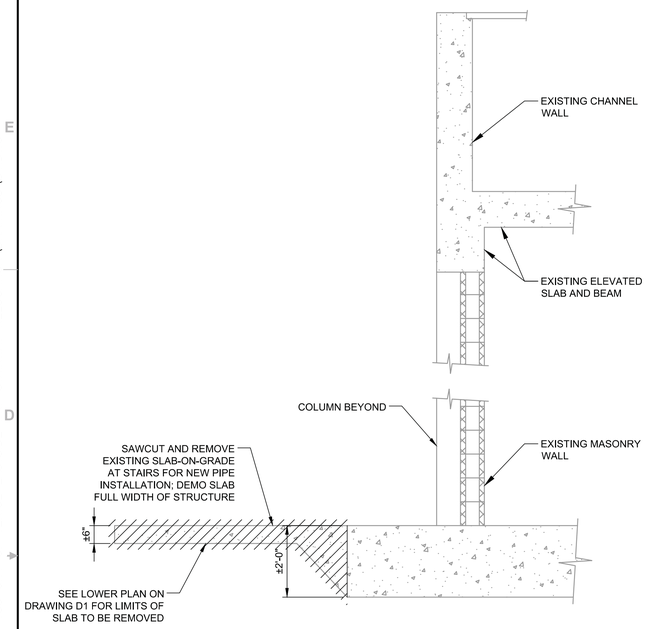
EASTSIDE WATER RECLAMATION FACILITY
LS FORCE MAIN RELOCATION PROJECT
CITY OF VENICE, FLORIDA

MISCELLANEOUS DETAILS

THIS ITEM HAS BEEN DIGITALLY SIGNED AND SEALED BY JOHN VINCENT SOBCZAK, PE, LICENSE NO. 71407, ON FEBRUARY 12, 2018.

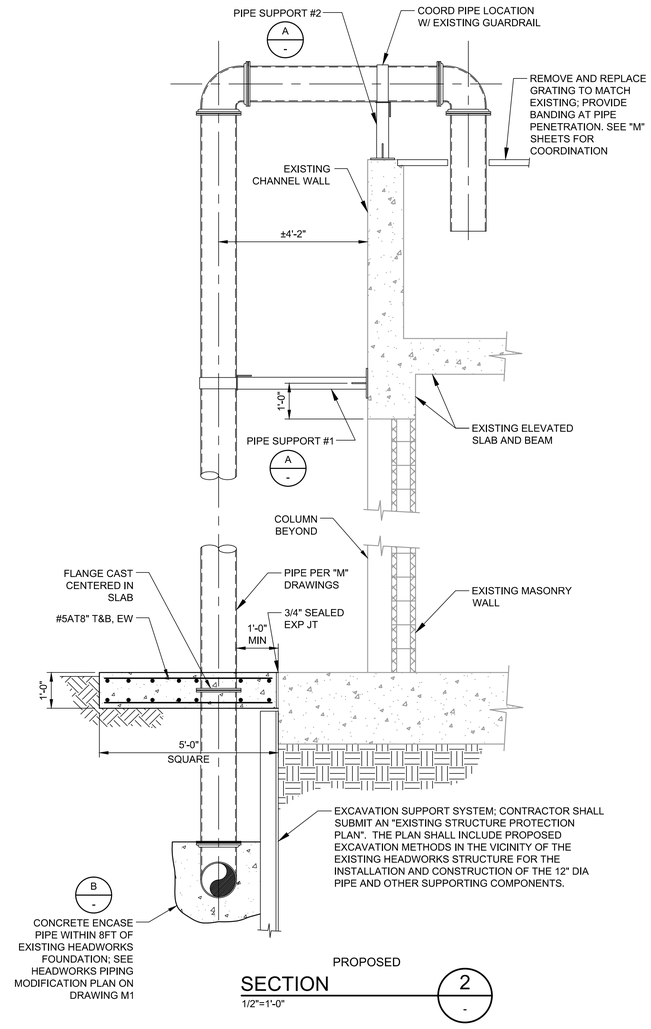
PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THIS SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES.

DATE	PROJECT NO.
FEB. 2018	22120-002-01
SCALE	DWG. NO.
AS NOTED	S3



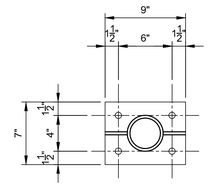
DEMOLITION

SECTION 1
1/2"=1'-0"

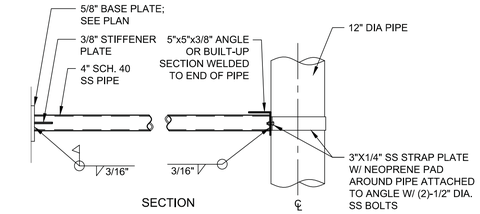


PROPOSED

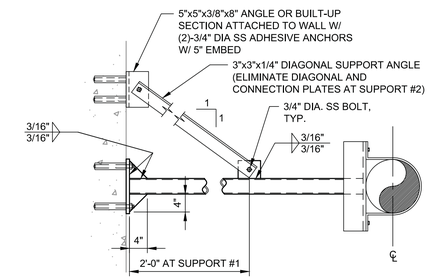
SECTION 2
1/2"=1'-0"



BASE PLATE PLAN



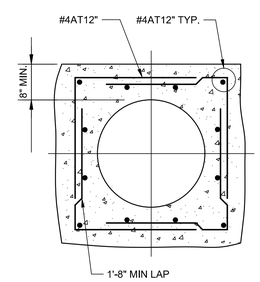
SECTION



PLAN

DETAIL A
3/4"=1'-0"

NOTES:
1. ALL STEEL SHOWN IS TO BE SS TYPE 316L.
2. ALL DIMENSIONS SHALL BE FIELD VERIFIED PRIOR TO ANY STEEL FABRICATION.



PIPE ENCASEMENT

DETAIL B
NTS

BID SET

WEKIVA ENGINEERING
711 N ORANGE AVE, SUITE A
WINTER PARK, FL 32789
P: 321.972.4969 CA Lic. No: 31920

LTR.	DATE	REVISIONS	BY	APPRD.

DESIGNED JSOBCZAK
DRAWN JSOBCZAK
CHECKED DMORRIS

JonesEdmunds
CERTIFICATE OF AUTHORIZATION #1841
730 NE WALDO ROAD, GAINESVILLE, FLORIDA 32641 / (352) 377-5821
7230 KYLE COURT, SARASOTA, FLORIDA 34240 (941) 358-1440

EASTSIDE WATER RECLAMATION FACILITY
LS FORCE MAIN RELOCATION PROJECT
CITY OF VENICE, FLORIDA

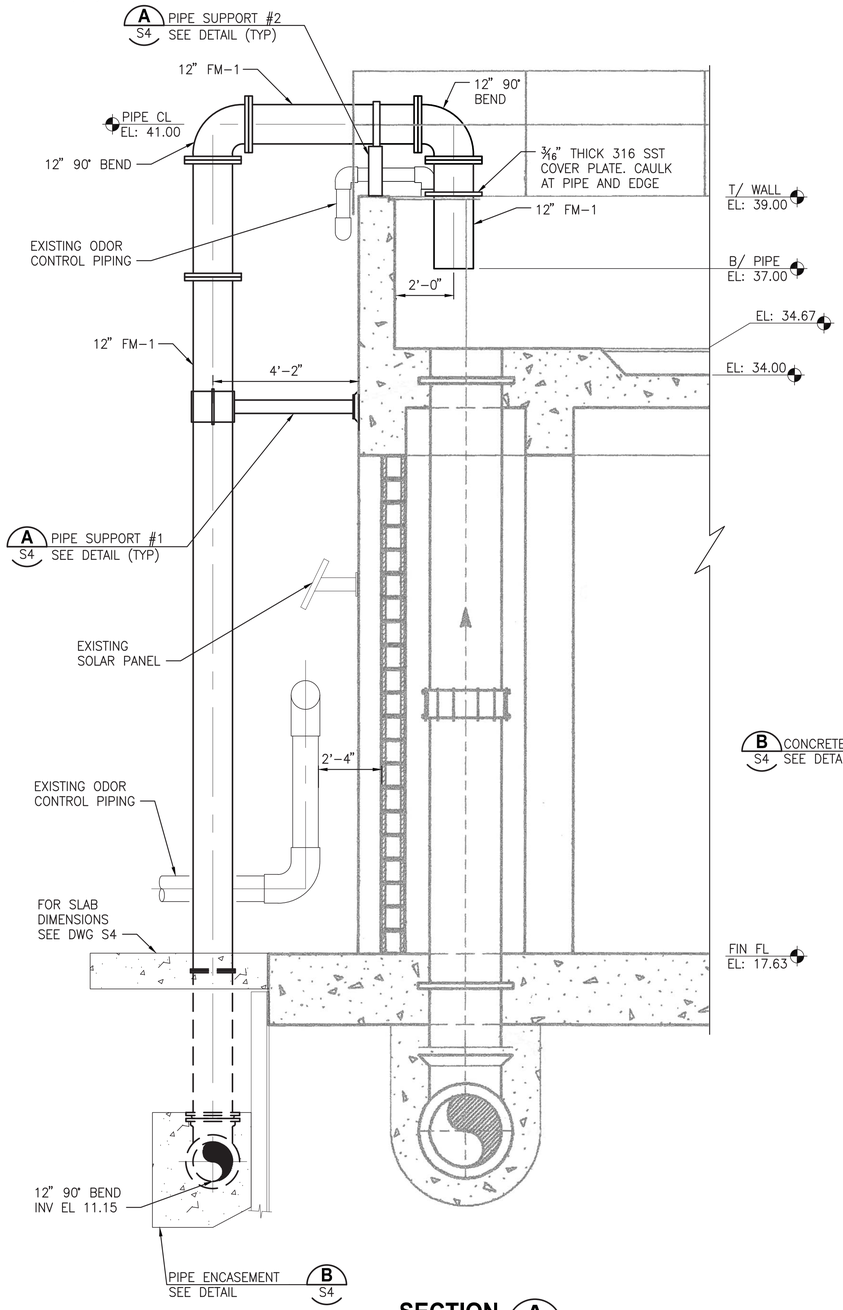
PIPE SUPPORT DETAILS

THIS ITEM HAS BEEN DIGITALLY SIGNED AND SEALED BY JOHN VINCENT SOBCZAK, PE, LICENSE NO. 71407, ON FEBRUARY 12, 2018.

PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THIS SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES.

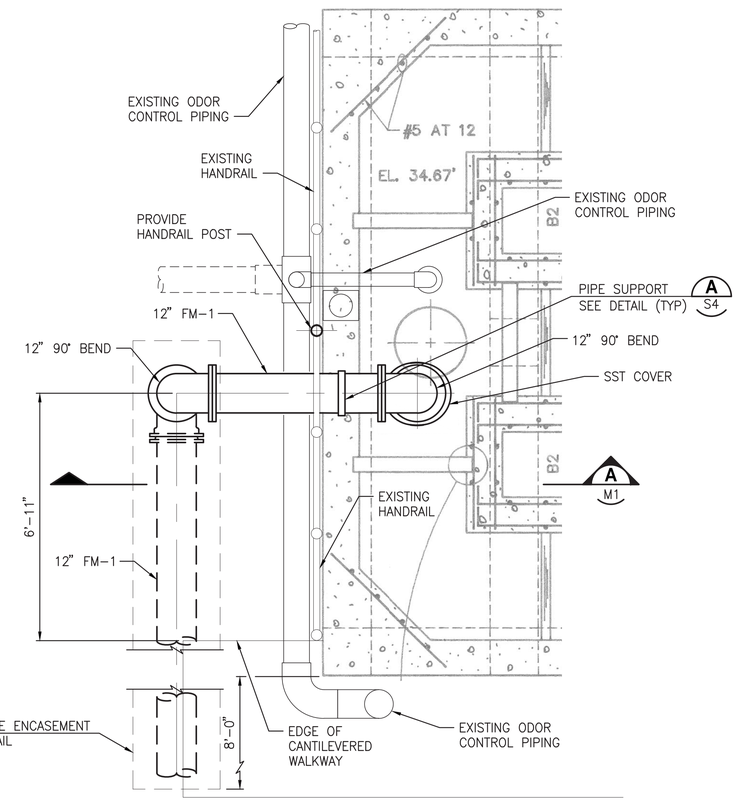
JOHN VINCENT SOBCZAK LICENSE No. 71407 STATE OF FLORIDA PROFESSIONAL ENGINEER

DATE	PROJECT NO.
FEB. 2018	22120-002-01
SCALE	DWG. NO.
AS NOTED	S4



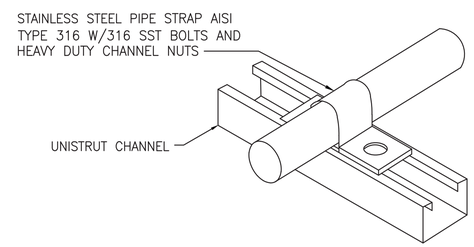
SECTION A
M1

1/2" = 1'-0"



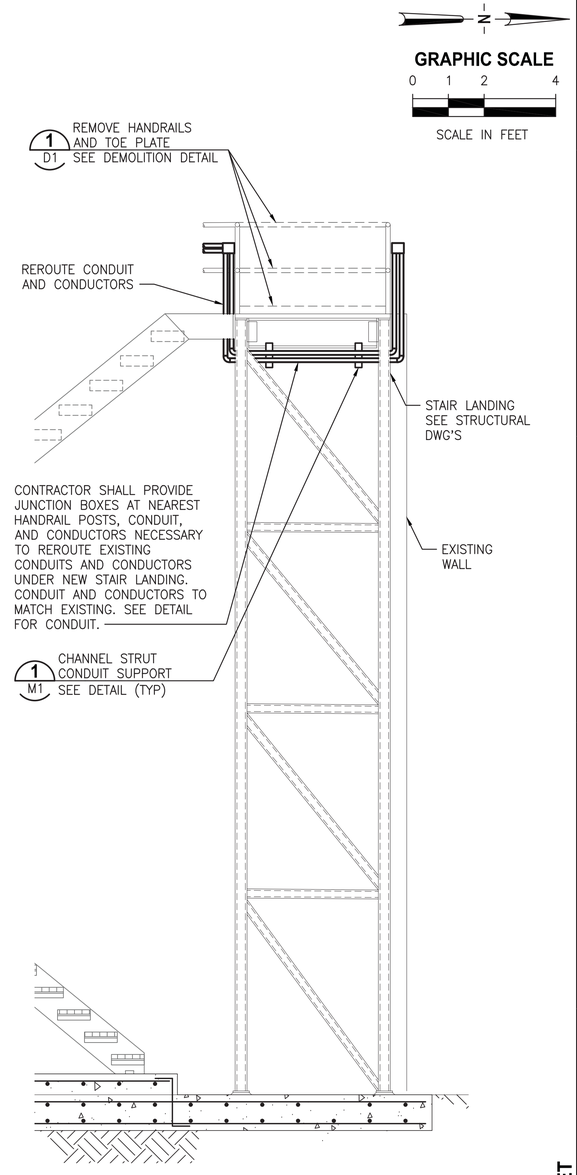
HEADWORKS PIPING MODIFICATION PLAN

1/2" = 1'-0"



NOTE:
1. ALL CHANNELS AND FITTINGS SHALL BE DIPPED GALVANIZED STEEL UNO.

CHANNEL STRUT CONDUIT SUPPORT DETAIL 1
M1



CONDUIT MODIFICATION DETAIL

1/2" = 1'-0"

GRAPHIC SCALE
0 1 2 4
SCALE IN FEET

BID SET

DOUGLAS ROY YOUNG LICENSE No. 44204 STATE OF FLORIDA PROFESSIONAL ENGINEER

LTR.	DATE	REVISIONS	BY	APPRD.

DESIGNED DYOUNG
DRAWN JKRAMER
CHECKED JBANKS

JonesEdmunds
CERTIFICATE OF AUTHORIZATION #1841
730 NE WALDO ROAD, GAINESVILLE, FLORIDA 32641 / (352) 377-5821
7230 KYLE COURT, SARASOTA, FLORIDA 34240 (941) 358-1440

EASTSIDE WATER RECLAMATION FACILITY
LS FORCE MAIN RELOCATION PROJECT
CITY OF VENICE, FLORIDA

HEADWORKS PIPING
MODIFICATION PLAN AND SECTION

THIS ITEM HAS BEEN DIGITALLY SIGNED AND SEALED BY DOUGLAS ROY YOUNG, PE, LICENSE NO. 44204, ON FEBRUARY 12, 2018.
PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THIS SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES.

DATE FEB. 2018
PROJECT NO. 22120-002-01
SCALE AS SHOWN
DWG. NO. M1

CITY OF VENICE PROCUREMENT-
FINANCE DEPARTMENT

401 W. VENICE AVE. - ROOM # 204
VENICE, FL. 34285
(941) 486-2626
FAX (941) 486-2790

ADDENDUM NO. 1

Date: April 4, 2018

To: All Prospective Proposers

Re: ITB# 3083-18: EWRF Lift Station Relocation and Reaeration Blower Replacement

---

This addendum sets forth changes and/or information as referenced and is hereby made part of and should be attached to the subject Contract Documents. Receipt of this Addendum shall be acknowledged below and in the submitted proposal. It shall be the responsibility of each proposer, prior to submitting a proposal, to contact the City of Venice- Procurement- Finance Department to determine if addenda were issued and to make such addenda a part of their proposal.

The following is to clarify and provide additional information requested during the pre-bid meeting held on March 29, 2018 at 2:00 P.M.

Peter Boers, Procurement Manager, opened the meeting

1. **Important dates:** Bids are due April 20, 2018 at 2:00 p.m. at City Hall room #204. Bids are to be delivered to Suite 204 in City Hall. The bid opening will take place in the Community Hall (room #114).

2. The Cut-Off for questions will be April 10, 2018 at 1:00 PM

3. Mr. Boers advised the bidders to read *Instructions to Bidders*, but made note of the following Articles.

4. Article 10 Bid Security - 5% Bid Security is required.

5. Article 11 Contract Times – time to completion is 120 days (Lift Station) and 195 days (Blower) from NTP. See Clarifications section below regarding NTP.

6. Article 12 Liquidated Damages - Mr. Boers advised that the stipulated damages for this project are $1,532 per day.

7. Article 23 Contract Securities - The awarded contractor will be required to provide a Performance and Payment Bond equaling 100% of the contact amount. **EXHIBIT A**
8. Article 24 Contractors Insurance -Mr. Boers reviewed **EXHIBIT B**: *Insurance Requirements*.
    a. General Liability -$1,000,000 per occurrence/1,000,000 aggregate
    b. Business Auto Liability - $1,000,000 combined single limit
    c. Worker's Comp per State Statute
    d. Builder's Risk Installation Floater

9. Article 29 Local Preference – Local preference is applicable to this bid.

10. Mr. Boers reviewed the required forms that must be returned with each firm's submittal. These required forms are listed in the Appendix of the bid document. Mr. Boers advised, even if a form does not pertain to said company - to still mark it with a "N/A" and return it with each submittal. Mr. Boers also advised that the *Required Forms List* could be used as a "check off" sheet for firms to use.

11. Ms. Lindsay Marten, the City's Project Manager, asked Jones Edmunds and Hazen and Sawyer to review the scope of work and provide a brief overview of their respective projects.

12. Mr. Boers opened the floor for bidder's questions. He advised the attendees to follow up in writing if they do not see an answer to their question published in an addendum and to not assume a change is in effect unless published in an addendum.

CLARIFICATIONS:

The Engineer's Estimate for the LS FM Relocation Project is $107,358.00 and for the Reaeration Blower Replacement Project is $541,000.

One preliminary NTP will be issued at contract award to allow for construction administration tasks including, but not limited to, shop drawing reviews and the procurement of products/equipment. One construction NTP will be issued following the completion of shop drawing reviews and the procurement of products/equipment; and the time to completion date used will be 195 days, as this is the longer duration of the two projects.

The Statement of References for Contractor form has been updated (attached). Provide two (2) plant projects of similar scope and size for the reaeration blower project, and two (2) projects for the LS FM relocation project.

REVISIONS:

Rearation Blower Replacement:

- Modify Section 17000, paragraph 2.03, paragraph B. to change the words "center flange shall be epoxy coated carbon steel" to "center flange shall be Type 304 stainless steel".
- Modify Section 17000, paragraph 2.03, paragraph C. to change the line size and type in the third bullet from "8-inch ductile iron" to "6-inch SCH 10 stainless steel".
- Modify Section 17000, paragraph 2.03 to add paragraph D as follows: The Venturi flow meter shall meet the above stated accuracy with a Reynolds number of at least 75,000. The Venturi meter discharge coefficient shall be 0.980, independent of line size or beta ratio, and have a permanent pressure loss not exceeding 10% of the differential pressure at maximum flow rate. The Venturi insert flow meter shall be as manufactured by Primary Flow Signal of Cranston, RI, or approved

equal, and shall be compatible with and utilize a differential pressure indicating transmitter as specified herein to provide remote monitoring of the measured flow.

- Issue updated sheet C05, with modifications to pipe bedding detail (attached).
- Modify Section 02222, Excavation and Backfill for Utilities, paragraph 3.05.A to read as follows:

Pipe trenches shall be excavated as described in Article 3.01 of this Section. The resulting excavation shall be backfilled with acceptable pipe bedding material, ~~up to the level of the centerline of the proposed pipe barrel~~ to 6-inches above the top of pipe. This backfill shall be tamped and compacted to provide a proper bedding for the pipe and shall then be shaped to receive the pipe. Bedding shall be provided under the branch of all fittings to furnish adequate support and bearing under the fitting.

QUESTIONS

LS FM Relocation:

RE: specification section 09900, page 5, System 10:

Q. Item e, Intermediate coat. We are requesting that Tnemec Series 104 be removed and Tnemec Series 66HS Hi-Build Epoxoline be added.
A. Please update to Tnemec Series 66HS Hi-Build Epoxoline, as this is a newer product.
Q. Item f, Finish coat. We are requesting that Tnemec Series 1075 be replaced with Tnemec Series 1095 Endura-Shield at the same thickness.
A. Please update to Tnemec Series 1095 Endura-Shield, as this is a newer product.

Q. In specification section 09900, page 6-7, System 36; This section is not clear, please clarify if this is for a lining on the interior of the lift station or the interior of rooms. Tnemec is specified with their coatings for severe wastewater service such as headworks, grit chambers etc. the other materials listed for general purpose coatings for interior rooms.
A. System 36 shall be removed, as it is not needed for this project.

Q. Where are the nearest valves for isolating the existing force main for connecting the new force main?
A. The nearest valve to the south is adjacent to the point of connection. There are no isolation valves to the north until the lift station located on the west side of the Second Anoxic Basins.

Peter A. Boers
Procurement Department

Acknowledgment is requested even if you have elected not to respond to this bid. A designated management representative of your firm can sign the receipt for this addendum. Please acknowledge receipt of this addendum immediately by fax to (941) 486-2790 or mail to the above noted address, if a fax is not possible.

Receipt Acknowledged:

_____
Signature

_____
Company

_____
Date

STATEMENT OF REFERENCES
FOR CONTRACTOR

Addendum 1 Revision

NAME OF CONTRACTOR: _____

BUSINESS ADDRESS: _____

How many years have you been engaged in the business under the present firm name? _____

List previous business experience: _____

Provide two (2) plant projects of similar scope and size for the reaeration blower project, and two (2) projects for the LS FM relocation project.

(1) Project Name: _____

Project Description _____

_____

Construction Start Date _____ Construction Finish Date _____

Owner contact: _____

Company Name: _____

Telephone:_____ E-mail: _____

Design Engineer contact: _____

Company Name: _____

Telephone:_____ E-mail: _____

(2) Project Name: _____

Project Description _____

_____

Construction Start Date _____ Construction Finish Date _____

Owner contact: _____

Company Name: _____

Telephone:_____ E-mail: _____

Design Engineer contact: _____

Company Name: _____

Telephone:_____ E-mail: _____

[Type here]

STATEMENT OF REFERENCES
FOR CONTRACTOR
Addendum 1 Revision

(3) Project Name: _____

Project Description _____

_____

Construction Start Date _____ Construction Finish Date _____

Owner contact: _____

Company Name: _____

Telephone:_____ E-mail: _____

Design Engineer contact: _____

Company Name: _____

Telephone:_____ E-mail: _____

(4) Project Name: _____

Project Description _____

_____

Construction Start Date _____ Construction Finish Date _____

Owner contact: _____

Company Name: _____

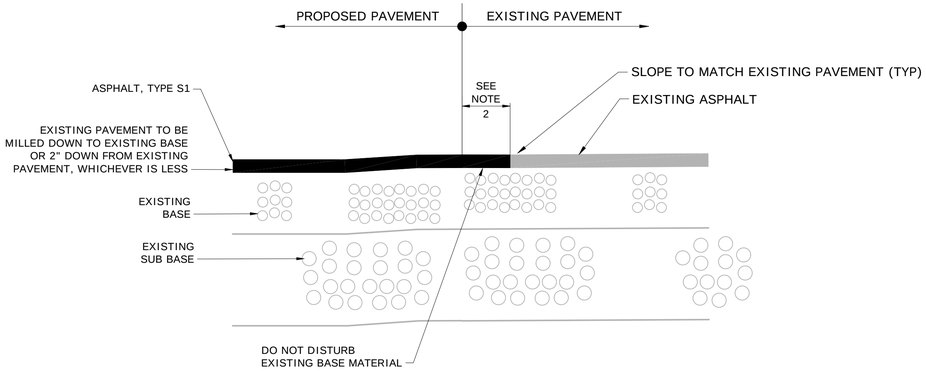
Telephone:_____ E-mail: _____

Design Engineer contact: _____

Company Name: _____

Telephone:_____ E-mail: _____

[Type here]



NOTES:

1. TYPICAL DETAIL FOR AREAS TO BE MILLED AND RE-SURFACECD.
2. AT LOCATIONS WHERE OVERLAY WILL TIE- IN TO EXISTING PAVEMENT, CONTRACTOR SHALL SAW-CUT A CLEAN STRAIGHT EDGE OF THE EXISTING PAVEMENT (TYP) ALONG THE PROPOSED RESURFACE AREA, AND MATCH THE THICKNESS OF THE EXISTING PAVEMENT.

TYPICAL PAVEMENT RESURFACE

A.) **HEAVY DUTY**: COMMERCIAL AND INDUSTRIAL DEVELOPMENTS WITHIN PRIMARY ACCESSWAYS, PARKING LOTS, ETC. WITH EXPOSURE TO TRUCK TRAFFIC

B.) **LIGHT DUTY**: RESIDENTIAL SUBDIVISIONS AND COMMERCIAL DEVELOPMENTS WITHIN LOW VOLUME ACCESSWAYS, PARKING LOTS, ETC. (LESS THAN 5% TRUCK TRAFFIC)

	A	B
SUBGRADE - TYPE B STABILIZED LBR 40 MIN.	12"	8"
ABC3 - ASPHALT BASE	5"	4"
CTB	10"	7"
CCA	10"	7"
ASPHALTIC CONCRETE	1 1/2" OF S-1	1 1/2" OF S-1/S-3

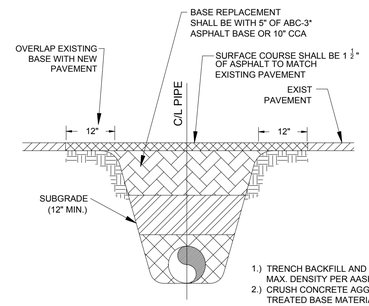
CONCRETE PAVEMENT FOR PARKING LOTS ONLY:

SUBGRADE - 12" TYPE B STABILIZED LBR 40 MIN.

PAVEMENT - 6" CONCRETE 3000PSI @28 DAYS WITH MAX. 4" SLUMP & FIBER REINFORCEMENT.

PAVEMENT STANDARD

N.T.S.

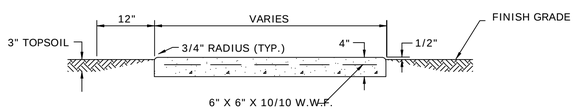


1.) TRENCH BACKFILL AND SUBGRADE TO BE COMPACTED TO 98% OF MAX. DENSITY PER AASHTO T-180.
2.) CRUSH CONCRETE AGGREGATE MUST HAVE AN LBR ≥ 150. CEMENT TREATED BASE MATERIAL MUST YIELD COMPRESSIVE STRENGTH WITHIN THE RANGE OF 175 TO 275 PSI. SHELL IS NOT AN ACCEPTABLE BASE MATERIAL.

PAVEMENT RESTORATION DETAIL

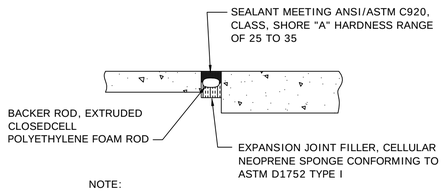
N.T.S.

	CITY OF VENICE ENGINEERING DEPARTMENT	ENGINEERING	DATE JAN. 2016
H:\My Documents\city on the gulf logo.jpg	401 WEST VENICE AVE. VENICE FL 34285 (941) 486-2626 FAX (941) 480-3031	PAVEMENT & RESTORATION	SHEET NO. ENG-2



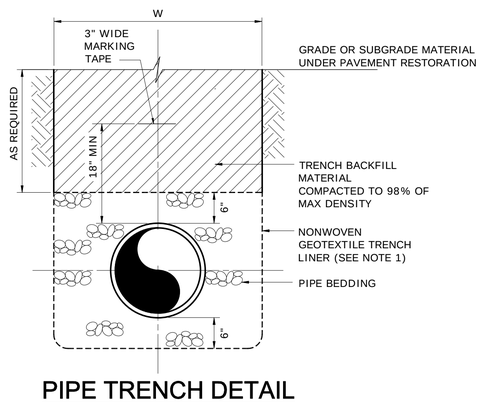
NOTE:
THE CONTRACTOR SHALL CONSTRUCT AN EXPANSION JOINT AT SPACINGS SHOWN ABOVE, AT THE END OF DAYS WORK, POINTS OF CURVATURE, AND AT ADJOINING STRUCTURES.

SIDEWALK SECTION



NOTE:
CONTRACTOR SHALL SUBMIT EXPANSION JOINT PRODUCT DATA SHEETS FOR REVIEW AND APPROVAL.

EXPANSION JOINT DETAIL



TRENCH EXCAVATION LIMITS		
INTERNAL DIAMETER OF PIPE	W WIDTH OF TRENCH	
	MAX	W=MIN
4"-6"	3'-0"	2'-0"

W = TRENCH WIDTH AT BOTTOM OF PIPE. TRENCH SIDE SLOPES SHALL BE IN ACCORDANCE WITH OSHA REQUIREMENTS.

PIPE TRENCH DETAIL

NOTE:

1. GEOTEXTILE SHALL BE A MINIMUM 8-OUNCE PER SQUARE YARD (NOMINAL) NONWOVEN NEEDLE PUNCHED SYNTHETIC FABRIC CONSISTING OF STAPLE OR CONTINUOUS FILAMENT POLYPROPYLENE. GEOTEXTILE SHALL BE INERT AND UNAFFECTED BY LONG TERM EXPOSURE TO CHEMICALS OR LIQUIDS WITH A PH RANGE FROM 3 TO 10. GEOTEXTILE SHALL HAVE A SURVIVABILITY CLASS OF CLASS 1 OR 2 IN ACCORDANCE WITH AASHTO M288, UNLESS OTHERWISE SPECIFIED HEREIN. ACCEPTABLE PRODUCTS ARE MIRAFI 180N OR EQUIVALENT.

REV	ISSUED FOR	DATE	BY
1	ADDENDUM 1	3/2018	AJC

PROJECT ENGINEER:	A. COLEMAN
DESIGNED BY:	RDM
DRAWN BY:	ESM
CHECKED BY:	AJC
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE	0 1/2" 1"

Name: Date:
Florida Professional Engineer's Registration Number:

Hazen

HAZEN AND SAWYER
7334 DELAINEY COURT
SARASOTA, FLORIDA 34240

CITY OF VENICE, FLORIDA

EASTSIDE WATER RECLAMATION FACILITY
REAERATION BLOWER REPLACEMENT PROJECT

CIVIL DETAILS

DATE:	MARCH 2018
HAZEN NO.:	41078-006
CONTRACT NO.:	
DRAWING NUMBER:	C05

CITY OF VENICE PROCUREMENT-
FINANCE DEPARTMENT

401 W. VENICE AVE. - ROOM # 204
VENICE, FL. 34285
(941) 486-2626
FAX (941) 486-2790

ADDENDUM NO. 2

Date: April 11, 2018

To: All Prospective Proposers

Re: ITB# 3083-18: EWRF Lift Station Relocation and Reaeration Blower Replacement

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This addendum sets forth changes and/or information as referenced and is hereby made part of and should be attached to the subject Contract Documents. Receipt of this Addendum shall be acknowledged below and in the submitted proposal. It shall be the responsibility of each proposer, prior to submitting a proposal, to contact the City of Venice- Procurement- Finance Department to determine if addenda were issued and to make such addenda a part of their proposal.

QUESTION(S):

Q. Please advise what permits will be required of the contractor and what are the related costs of each?
A. Blower Project: Required permits for the Contractor are discussed in Section 01010, Paragraph 1.04. FM Project: No permits are required.

Q. The project includes two bid forms. One for the FM project and one for the Blower project. Is it the City's intent to award both projects or would the City possibly only award one of the projects? Awarding both projects will give the City the best value for the project.
A. It is the City's intent to award both projects to one (1) Contractor.

Q. In continuation of the above question, how will the City make the award recommendation if only one of the two projects is awarded?
A. It is the City's intent to award both projects to the lowest responsive and responsible bidder.

Q. The FM Bid Form does not have an allowance for Permitting and the Blower project does. Please confirm no Permits are required for the FM project.
A. FM Project: No permits are required.

Q. Since the bid submission requires four total copies, would it be possible to submit the "Bid Form Summary" only and then follow-up with the two "Bid Schedules" within 24-72 hours after the bid opening?
A. No, four (4) copies of the bid submittal form, all required forms, and signed addenda are required for bid opening.

Q. Are the LDs listed in the Sample Contract, subpart (5) for substantial completion or final completion?
A. Final Completion.

Q. As per Exhibit C, subpart 4.d.) and 00800-3, subpart 4.d.), please confirm Builder's Risk insurance is not required. No builds are being contracted on this project.
A. A Builder's Risk Installation Floater is required.

Q. Blower Project: Due to the lack of availability of ASTM A778 and A774 Stainless Pipe materials would the following be acceptable?

Pipe: ASTM A312, T304L, Sch. 10s Wall, ERW Stainless Steel
Fittings: ASTM A403, T304L, Sch. 10s Wall, ERW Stainless Steel
Flanges: ASTM A240, T304, 150#, Angle Face Ring/With SS Backup Flange, Stainless Steel Std. De-Oxidation after Fabrication

A. **Pipe:** ASTM A312, T304L, Sch. 10s Wall, ERW Stainless Steel is acceptable, in lieu of the ASTM 778 material required in Specification 15012.
Fittings: ASTM A403, T304L, Sch. 10s Wall, ERW Stainless Steel is acceptable in lieu of the ASTM A774 material required in Specification 15012
Flanges: See Section 15012, paragraph 2.01.D
All other requirements of Section 15012 shall be met.

Q. Blower Project: Section 15101 Butterfly Valves (Process Air). 2.01 require the BFV's to be 304SS Conforming to AWWA C504. (We are not aware of any manufacturer that builds SS BFV's conforming to AWWA).
2.02(general) requires the BFV's to be C504, NSF61, Class150B, Flanged CI or DI Body, Epoxy Coated. This is a contradiction. Would you please clarify the BFV Specification Section?
A. Refer to the Revision to Section 15101, Paragraph 2.01 listed below under REVISION(S).

Q. FM project: The specs section 02220, 1.03, C, states, Before beginning demolition work, the contractor shall complete all modifications to maintain flow through the headworks. I do not see that any of our work affects the flow thru the headworks. Please clarify. What work in the current design affects the current flow thru the headworks?
A. Flow through the headworks should not be affected by construction of the force main. However, the headworks must remain fully accessible and operational throughout construction of the project.

Q. FM project: Section 0220, 1.06, A, states the contractor is to engage the service of a PE to design a temporary access to and shoring/bracing of the existing structure…etc. The contractor should not have the responsibility of this access. It is very ambiguous. This should be the responsibility of the project design engineer to provide the contractor a design that will be acceptable to the owner. Please review and revise this requirement.
As an option, can a mechanical lift be provided to the owner for their access as needed?
A. There are various ways to provide plant operators safe and effective access to the headworks, and to protect the existing headworks structure during construction. The intent is to allow the Contractor the flexibility to select the means and methods to do so. Mechanical equipment specifically designed for human occupancy would be acceptable to provide access. All necessary safety equipment must be included.

Q. Blower project: There have been several questions/concerns regarding the work required for pay item #9.
It is not clear what is required for items listed in Spec section 01025, 9, b, furnish & installation of field instruments……blower remote monitoring & control from existing plant HMI as spec'd, integrating signals from new blower & field instruments & updates to existing HMI screens within SCADA.
Please clarify in detail what is to be included. Who performs the City of Venice SCADA work?
A. See Section 17000 for all instruments and controls not furnished with the blowers (Item 4 of the payment items listed in Section 01025), which are specified in Section 11185.

CLARIFICATION(S):

Blower project: Sheet M-2 shall include the following modification:

Contractor shall furnish and install a 6-inch long flanged spool piece between both of the butterfly valves and the 6-inch tee to the south of the insert venturi flow meter. All upstream dimensions from the northern butterfly valve shall be maintained.

Blower project: Section 11185, Positive Displacement Blowers, Paragraph 2.04.I shall be replaced with the following:

The blower manufacturer shall furnish a discharge isolation butterfly valve for each of the new blowers outside of the enclosure as shown on the Drawings. Valves shall be high performance, resilient-seated butterfly valves as manufactured by Pratt, Bray or engineer approved equal. Valves less than 30-inches shall have a lug style body and be compatible with ASME B16.1 flanges. The CONTRACTOR shall coordinate flange connections upstream and downstream of the valves. Valves shall have ASTM A536 (65-45-12) ductile iron bodies, with 316 stainless steel discs and shafts. Viton seats suitable for 300° F operation shall be provided. All valve components shall be suitable for operation at temperatures up to 300°F with a 25 psig minimum working pressure. Discharge isolation valves shall be provided with a handwheel operator and shall provide for air tight shut-off. A mechanical dial indicator shall be provided on the operator to continuously indicate valve position.

REVISON(S):

Blower project: Section 15101, Paragraph 2.01 shall be replaced with the following:

2.01 BUTTERFLY VALVES (PROCESS AIR)

A. Isolation valves and throttling valves for low pressure air service shall be high performance, resilient-seated butterfly valves as manufactured by Pratt, Bray, or engineer approved equal. Valves less than 30-inches shall have a lug style body and be compatible with ASME B16.1 flanges. The Contractor shall coordinate flange connections upstream and downstream of the valves. Valves shall have ASTM A536 (65-45-12) ductile iron bodies, with 316 stainless steel discs and shafts. Viton seats suitable for high temperature operation shall be provided. All valve components shall be suitable for continuous operation at temperatures up to 300°F with a 25 psig minimum working pressure. Valves shall be provided with a handwheel operator and shall provide for air tight shut-off. A mechanical dial indicator shall be provided on the operator to continuously indicate valve position.

Paragraphs 2.02.A – 2.02.J shall be removed from Section 15101.

Peter A. Boers
Procurement Department

Acknowledgment is requested even if you have elected not to respond to this bid. A designated management representative of your firm can sign the receipt for this addendum. Please acknowledge receipt of this addendum immediately by fax to (941) 486-2790 or mail to the above noted address, if a fax is not possible.

Receipt Acknowledged:

_____
Signature

_____
Company

_____
Date

CITY OF VENICE PROCUREMENT-
FINANCE DEPARTMENT

401 W. VENICE AVE. - ROOM # 204
VENICE, FL. 34285
(941) 486-2626
FAX (941) 486-2790

ADDENDUM NO. 3

Date: April 18, 2018

To: All Prospective Proposers

Re: ITB# 3083-18: EWRF Lift Station Relocation and Reaeration Blower Replacement

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REVISON(S):

The bid form for the EWRF Lift Station portion has been revised so that bid items 1 – 5 are included in the Total Base Bid brought forward to the Bid Summary page. Bidders are advised to use the attached Addendum 3 revision in their bid submittal.

Peter A. Boers
Procurement Department

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Receipt Acknowledged:

_____
Signature

_____
Company

_____
Date

EWRF LIFT STATION FORCE MAIN RELOCATION BID SCHEDULE					
ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
1	Mobilization/Demobilization	LS	1	$	$
2	**DEMOLITION AND TEMPORARY ACCESS**				
2a	Remove Stairway and Protect for Relocation	LS	1	$	$
2b	Demolish Stairway Slab	LS	1	$	$
2c	Provide Temporary Stairway	LS	1	$	$
3	**PIPE, FITTINGS, AND VALVES**				
3a	12" DI Flanged Pipe	LF	43	$	$
3b	12" DI MJ Pipe	LF	95	$	$
3c	12" 22.5-Degree Bend	EA	2	$	$
3d	12" 45-Degree Bend	EA	4	$	$
3e	12" 90-Degree Bend	EA	4	$	$
3f	12" Tee	EA	1	$	$
3g	12" Sleeve	EA	1	$	$
3h	12" Plug Valve	EA	1	$	$
4	**STRUCTURAL**				
4a	Stairway Slab	LS	1	$	$
4b	Pipe Support Slab	LS	1	$	$
4c	Stairway Landing	LS	1	$	$
4d	Relocate Stairway	LS	1	$	$
4e	Sidewalk	LS	1	$	$
4f	Pipe Supports				
4f1	Pipe Support #1	EA	1	$	$
4f2	Pipe Support #2	EA	1	$	$
5	Owner's Allowance	Allowance			$ 15,000.00
	TOTAL (ITEMS 1 through 5, inclusive)				**$**

Total Base Bid (Sum of Items 1 through 5, inclusive) $ _____

(in numbers)

Total Base Bid in Words (Sum of Items 1 through 5, inclusive)

$ _____

Bidder agrees to furnish and install equipment from the above circled manufactuers in accordance with the provisions and under the terms of the Contract Documents.

NAME OF BIDDER: _____

BIDDER'S SIGNATURE: _____

CURRENT LICENSE NUMBER: _____

DATE: _____