CITY OF LAKE WORTH, FLORIDA

CITY OF LAKE WORTH
LIME SYSTEM UPGRADES AND IMPROVEMENTS

IFB NO. 16-130

BID SET

October 2016

CITY OF LAKE WORTH
WATER UTILITIES ADMINISTRATION
301 College St. Lake Worth, FL 33461
561.586.1710

MATHEWS CONSULTING
a BAXTER & WOODMAN company

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FOR

CITY OF LAKE WORTH
WATER TREATMENT PLANT
UPGRADES AND IMPROVEMENTS

IFB NO. 16-130

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Date: _____

00020
INVITATION TO BID

Sealed bids, in duplicate, will be received by City of Lake Worth Financial Services, City Hall, 2nd Floor, 7 North Dixie Highway, Lake Worth, Florida 33460 for the subject Project until 3:00 p.m., local on November 17, 2016, then opened publicly at that time.

The OWNER for the Project is City of Lake Worth, Florida.

The Contract Documents are available in electronic format on the City of Lake Worth website (www.lakeworth.org/business/bids). Contract Documents also may be obtained from Oniva DemandStar. Any bid received from a bidder that is not a plan holder of record on DemandStar will be returned unopened.

A non-mandatory pre-bid meeting will be held at 9:00 am on October 28, 2016 at the Lake Worth Water Treatment Plant. Although the meeting is not mandatory, all prospective bidders are encouraged to attend.

All questions are to be submitted in writing to Mathews Consulting (Attn: Jason A. Pugsley, P.E.) via email (jpugsley@mathewsconsultinginc.com). The last day to submit questions is five (5) business days before the date bids are due.

This Contract is a Lump Sum contract.

Bids must be accompanied by a Bid Security in the form of a certified or bank check made payable to the Owner, or a Bid Bond. The amount of the security shall not be less than five (5) percent of the Bidder's total price indicated in Bid Form.

No Bid may be withdrawn for a period of 120 days after the scheduled closing date for the receipt of bids except as otherwise provided in Article 13 of the Instructions to Bidders.

The successful Bidder, who is awarded the Contract, shall be required to furnish a 100% Construction Performance Bond and a 100% Construction Payment Bond.

The OWNER reserves the right to reject any or all Bids, to waive informalities, and to re-advertise.

/s/ Corinne Elliot, Assistant Finance Director

Publish: Palm Beach Post -

00100
INSTRUCTIONS TO BIDDERS

1. DEFINED TERMS.

Terms used in these Instructions to Bidders which are defined in the Standard General Conditions of the Construction Contract (EDCJC C-700, 2013 Edition) have the meanings assigned to them in the General Conditions. The term "Bidder" means one who submits a Bid directly to Owner, as distinct from a sub-bidder, who submits a bid to a Bidder. The term "Successful Bidder" means the lowest, qualified, responsible and responsive Bidder to whom Owner (on the basis of Owner's evaluation as hereinafter provided) makes an award. The term "Bidding Documents" includes the Advertisement or Invitation to Bid, Instructions to Bidders, the Bid Form, and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids).

2. COPIES OF BIDDING DOCUMENTS.

2.1. Complete sets of the Bidding Documents in the number and for the cost, if any, stated in the Advertisement or Invitation to Bid may be obtained from Owner (unless another issuing office is designated in the Advertisement or Invitation to Bid).

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

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

3. QUALIFICATIONS OF BIDDERS.

To demonstrate qualifications to perform the Work, each Bidder must be prepared to submit within five days of Owner's request, written evidence such as financial data, previous experience, present commitments and other such data as may be reasonably specifically requested by Owner or otherwise required in Contract Documents. Each Bid must contain evidence of Bidder's qualification to do business in the State where the Project is located.

4. EXAMINATION OF CONTRACT DOCUMENTS AND SITE.

4.1. It is the responsibility of each Bidder before submitting a Bid, to (a) examine the Contract Documents thoroughly, (b) visit the site to become familiar with local conditions that may affect cost, progress, performance or furnishing of the Work, (c) consider federal, state and local Laws and Regulations that may affect cost, progress, performance or furnishing of the Work, (d) study and carefully correlate Bidder's observations with the Contract Documents, and (e) notify Engineer of all conflicts, errors or discrepancies in the Contract Documents.

4.2. Reference is made to Division 1: General Requirements of the Specifications for the identification of:

4.2.1. those reports of explorations and tests of subsurface conditions at the site which have been utilized by Engineer in preparation of the Contract Documents.

4.2.2. those drawings of physical conditions in or relating to existing surface and subsurface conditions (except Underground Facilities) which are at or contiguous to the site which have been utilized by Engineer in preparation of the Contract Documents.

4.2.3. Copies of such reports and drawings (referred to above), if not attached to the Specifications or added on the Drawings, will be made available by Owner to any Bidder on request. Those reports and drawings are not a part of the Contract Documents. Bidder may not rely upon the accuracy of the non-technical data, interpretations or opinions contained in those reports and drawings. Bidder may not rely on the completeness of those reports and drawings for the purposes of bidding or construction.

Bidder may rely on any technical data contained in those reports and drawings specifically referenced in Division 1: General Requirements as technical data that can be relied on.

4.3. Information and data reflected in the Contract Documents with respect to 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 or others, and Owner does not assume responsibility for the accuracy or completeness thereof unless it is expressly provided otherwise in the Supplementary Conditions.

4.4. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders on subsurface conditions, Underground Facilities and other physical conditions, and possible changes in Contract Documents due to differing conditions appear in Paragraphs 5.03 and 5.05 of the General Conditions.

4.5. Before submitting a Bid, each Bidder will, at Bidder's own expense, be responsible to make or obtain such examinations, investigations, explorations, tests and studies and obtain any additional information and data which pertain to the physical conditions (surface, subsurface and Underground Facilities) at or contiguous to the site or otherwise which may affect cost, progress, performance or furnishing of the Work and which Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price and other terms and conditions of the Contract Documents.

4.6. On request in advance, Owner will provide each Bidder access to the site to conduct such explorations and tests as each Bidder deems necessary for submission of a Bid. Bidder shall fill all holes, clean up and restore the site to its former condition upon completion of such explorations.

4.7. The lands upon which the Work is to be performed, rights-of-way and easements for access thereto and other lands designated for use by Contractor in performing the Work are identified in the Contract Documents. All additional lands and access thereto required for temporary construction facilities or storage of materials and equipment are to be provided by Contractor. Easements for permanent structures or permanent changes in existing structures are to be obtained and paid for by Owner unless otherwise provided in the Contract Documents.

4.8. The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 4, that without exception the Bid is premised upon performing and furnishing the Work required by the Contract Documents and such means, methods, techniques, sequences or procedures of construction as may be indicated in or required by the Contract Documents, and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

5. INTERPRETATIONS AND ADDENDA.

5.1. All questions about the meaning or intent of the Contract Documents are to be directed to Engineer (unless another issuing office is designated in the Advertisement or Invitation to Bid). Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by issuing office as having received the Bidding Documents. Questions received less than five days prior to the date for opening of Bids may not be answered. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

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

6. BID SECURITY.

6.1. Each Bid must be accompanied by Bid security made payable to Owner in an amount of five percent of the Bidder's maximum Bid price and in the form of a certified or bank check or a Bid Bond issued by a surety meeting the requirements of Paragraph 6.01 of the General Conditions.

6.2. The Bid security of the Successful Bidder will be retained until such Bidder has executed the Agreement and furnished the required contract security, whereupon the Bid security will be returned. If the Successful

Bidder fails to execute and deliver the Agreement and furnish the required contract security within fifteen days after the Notice of Award, Owner may annul the Notice of Award and the Bid security of the Bidder will be forfeited. The Bid security of other Bidders whom Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of the seventh day after the Effective Date of the Agreement or the 120th day after the Bid opening, whereupon Bid security furnished by such Bidders will be returned. Bid security with Bids which are not competitive will be returned within seven days after the Bid opening.

7. CONTRACT TIME.

The numbers of days within which, or the dates by which, the Work is to be substantially completed and also completed and ready for final payment (the Contract Time) are set forth in the Bid Form and the Agreement. If Contract Times are left blank in the Bid Form, the time for Substantial Completion and final completion are to be set forth by Bidder in the Bid and will be included in the Agreement. The times will be taken into consideration by Owner during the evaluation of Bids, and it will be necessary for the Successful Bidder to satisfy Owner of Bidder's ability to achieve Substantial Completion and final completion within the times designated in the Bid.

8. LIQUIDATED DAMAGES.

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

9. SUBSTITUTE OR "OR-EQUAL" ITEMS.

The contract, if awarded, will be on the basis of materials and equipment described in the Drawings or specified in the Specifications without consideration of possible substitute or "or-equal" items. Whenever it is indicated in the Drawings or specified in the Specifications that a substitute or "or-equal" item of material or equipment may be furnished or used by Contractor if acceptable to Engineer, application for such acceptance will not be considered by Engineer until after the Effective Date of the Agreement. The procedure for submission of any such application by Contractor and consideration by Engineer is set forth in Article 7 of the General Conditions and may be supplemented in Division 1: General Requirements.

10. SUBCONTRACTORS, SUPPLIERS AND OTHERS.

10.1. If the Bid Form or Specifications require (or if Owner requests after Bids are received) the identity of certain Subcontractors, Suppliers and other persons and organizations (including those who are to furnish the principal items of material and equipment) to be submitted to Owner in advance of the specified date prior to the Effective Date of the Agreement, the apparent Successful Bidder, and any other Bidder so requested, shall within seven days after the Bid opening (or seven days after request by Owner) submit to Owner a list of all such Subcontractors, Suppliers and other persons and organizations proposed for those portions of the Work for which such identification is required. Such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, person or organization if requested by Owner. Subcontractors shall be required to meet Contractor's liability insurance requirements as established by the General and Supplementary Conditions or be listed as an additional insured on the apparent successful Bidder's policy. If Owner or Engineer after due investigation has reasonable objection to any proposed Subcontractor, Supplier, other person or organization, either may before the Notice of Award is given request the apparent Successful Bidder to submit an acceptable substitute without an increase in Bid price. 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 persons and organizations. The declining to make requested substitutions will not constitute grounds for sacrificing the Bid security of any Bidder. Any Subcontractor, Supplier, other person or organization listed and to whom Owner or Engineer does not make 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 the General Conditions.

10.2. No Contractor shall be required to employ any Subcontractor, Supplier, other person or organization against whom Contractor has reasonable objection.

11. BID FORM.

11.1. The Bid Form is included with the Bidding Documents; additional copies may be obtained from Engineer (or the issuing office).

11.2. All blanks on the Bid Form must be completed in ink or by typewriter.

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

11.4. Bids by partnerships must be executed in the partnership name and signed by a general partner, whose title must appear under the signature and the official address of the partnership must be shown below the signature.

11.5. All names must be typed or printed below the signature.

11.6. The Bid shall contain an acknowledgement of receipt of all Addenda (the numbers of which must be filled in on the Bid Form). All Addenda are a part of the Bid documents and each Bidder will be bound by such Addenda, whether or not received by the Bidder. It is the responsibility of each Bidder to verify that he or she has received all Addenda issued before Bids are opened.

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

12. SUBMISSION OF BIDS.

Bids shall be submitted at the time and place indicated in the Advertisement or Invitation to Bid and shall be enclosed in an opaque sealed envelope, marked with the Project title (and, if applicable, the designated portion of the Project for which the Bid is submitted) and name and address of the Bidder and accompanied by the Bid security and other required documents. **If the Bid is sent through the mail or other delivery system the sealed envelope shall be enclosed in a separate envelope with the notation "BID ENCLOSED FOR "City of Lake Worth WTP Upgrades and Improvements, IFB No. 16-130" TO BE OPENED _ November 17, 2016 at 3:00 p.m." on the face of it.** One (1) original and two (2) copies of all Bid documents shall be submitted

13. MODIFICATION AND WITHDRAWAL OF BIDS.

13.1. Bids may be modified or withdrawn by an appropriate document duly executed (in the manner that a Bid must be executed) and delivered to the place where Bids are to be submitted at any time prior to the opening of Bids.

13.2. If, within twenty-four hours after Bids are opened, any Bidder files a duly signed, written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid and the Bid security will be returned. Thereafter, that Bidder will be disqualified from further bidding on the Work to be provided under the Contract Documents.

14. OPENING OF BIDS.

Bids will be opened (publicly or privately) as indicated in the Invitation to Bid.

14.1. When Bids are opened publicly they will be read aloud, and the amounts of the base Bids and major alternates (if any) will be made available after the opening of Bids. If applicable, the bid will be opened in accordance with sec. 255.0518, Florida Statutes.

14.2. When Bids are opened privately, an abstract of the same information (will or will not) be made available to Bidders within seven days after the date of Bid opening.

15. BIDS TO REMAIN SUBJECT TO ACCEPTANCE.
All bids will remain subject to acceptance for _____120_ days after the day of the Bid opening, but Owner may, in its sole discretion, release any Bid and return the Bid security prior to that date.

16. AWARD OF CONTRACT.

16.1. Owner reserves the right to reject any and all Bids, to waive any and all informalities not involving price, time or changes in the Work and to negotiate contract terms with the Successful Bidder, and the right to disregard all nonconforming, nonresponsive, unbalanced or conditional Bids. Also, Owner reserves the right to reject the Bid of any Bidder if Owner believes that it would not be in the best interest of the Project to make and award to the Bidder, whether because the Bid is not responsive or the Bidder is unqualified or of doubtful financial ability or fails to meet any other pertinent standard or criteria established by Owner. Discrepancies in 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.

16.2. In evaluating Bids, Owner will consider the qualifications of the Bidders, whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices and other data, as may be requested in the Bid Form or prior to the Notice of Award.

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

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

16.5. If the contract is to be awarded, it will be awarded to the lowest, responsive and responsible Bidder whose evaluation by Owner indicates to Owner that the award will be in the best interests of the Project and subject to the Owners Local Preference Policy. No bid shall be accepted from, nor will any Contract be awarded to any Bidder who is in arrears to the Owner upon any debt or Contract or who is a defaulter as surety or otherwise upon any obligation to the Owner or who has failed to perform faithfully any previous Contract with the Owner or other party as determined by the Owner.

16.6. If the contract is to be awarded, Owner will give the Successful Bidder a Notice of Award within _120_ days after the day of the Bid opening.

16.7. When Bidder is permitted to designate the Contract Time, Bid prices will be compared after adjusting for differences in the time designated in the Bid for Substantial Completion.

17. CONTRACT SECURITY.

Paragraph 6.01 of the General Conditions and the Supplementary Conditions set forth Owner's requirements as to performance and payment Bonds. When the Successful Bidder delivers the executed Agreement to Owner, it must be accompanied by the required performance and payment Bonds.

18. SIGNING OF AGREEMENT.

When Owner gives a Notice of Award to the Successful Bidder, it will be accompanied by the required number of unsigned counterparts of the Agreement with all other written Contract Documents attached. Within ____15__ days thereafter Contractor shall sign and deliver the required number of counterparts of the Agreement and attached documents to Owner with the required Bonds. In the event the successful Bidder fails to execute the Contract and return same to the Owner within the stipulated fifteen (15) days,

the Owner may disqualify the Bid, and said Bidder shall not be permitted to contest to the contrary and does waive such right upon submitting a Bid.

19. DISQUALIFICATION OF BIDDER

19.1 Bidder may be disqualified and its Bid rejected for any of the following:

a) Bidder does not meet the Competency of Bidder and Reference requirements set forth herein.
b) Reason to believe that collusion exists among or between Bidders
c) Unbalanced Bid; that is, Bid in which the prices bid for some items are out of all proportion to those Bids of others.
d) Bidder's uncompleted workload, which in the judgment of the Owner, may cause detrimental impact or impair the prompt completion of this Contract.
e) Lack of responsibility on the part of Bidder, (for example, no Bidder would be considered responsible who had failed to carry out any Contract in which the Owner had been directly or indirectly concerned), or to which Bidder failed to perform on other projects.
f) A determination by Owner of the Contractor's lack of experience or lack of competency as may be revealed by qualification statements, financial statements, experience records, references, or other questionnaires.
g) Substantial evidence of bad character or dishonesty.
h) Bidder is involved in any current litigation with Owner.
i) Bidder has defaulted on any contract or is in arrears on any contract.

20. LICENSES, PERMITS, AND CERTIFICATION

20.1 When applicable, vendor must hold a Certificate of Competency issued by the State of Florida or the Palm Beach County Construction Industry Licensing.

20.2 A business tax receipt obtained from the Owner shall be required of any person maintaining a permanent business location or branch office within the City of Lake Worth.

20.3 A copy of any licenses and permits shall be submitted with the Bid and must be in the name of the vendor shown on the Bid submittal.

21. PREPARATION EXPENSE

21.1 Neither the Owner nor its representatives will be liable for any expenses incurred in connection with the preparation, presentation or submittal of any Bid.

22. NON-COLLUSION

22.1 Bidder certifies that this Bid is made without prior understanding, agreement, or connection with any individual, firm, partnership, corporation or other entity submitting a Bid for the same materials, services, supplies, or equipment and is in all respects fair and without collusion or fraud. No premiums, rebates, or gratuities are permitted with, prior to, or after any delivery of material or provisions of services. Any violation of this provision may result in Contract cancellation, return of materials or discontinuation of services, and the possible removal of Bidder from the vendor Bid list(s).

23. CODE OF ETHICS

23.1 If any Bidder violates or is a party to a violation of the Code of Ethics of the Owner, Palm Beach County, and/or of the State of Florida with respect to this Bid, such Bidder may be disqualified from performing the work described in this Bid or from furnishing the goods or services for which this Bid is submitted and may be further disqualified from bidding on any future Bids for work or for goods or services for the Owner.

24. CONFLICT OF INTEREST

24.1 The award is subject to any and all applicable conflict of interest provisions found in the policies or Code of Ordinances of the City, the Palm Beach County Code of Ethics, and found in the Florida Statutes. All Bidders must complete the Conflict of Interest Form attached hereto.

25. DRUG FREE WORKPLACE PROGRAMS

25.1 Preference may be given to businesses with Drug-Free Work Place Programs. Whenever two or more Bids which are equal with respect to price, quality, and service are received by the Owner for the procurement of commodities or contractual services, a Bid received from a business that completes the attached DFW form certifying that it is a DFW may be given preference in the award process.

26. LEGAL REQUIREMENTS

26.1 Federal, State, County and Owner laws, ordinances, rules, codes, guidelines, directives and regulations that in any manner affect the items covered herein apply. Lack of knowledge by the Bidder shall in no way be a cause for relief from responsibility.

27. COMPLIANCE WITH OCCUPATIONAL SAFETY AND HEALTH ACT

27.1 The Bidder certifies that all equipment and materials contained in this Bid shall meet all O.S.H.A. requirements. Bidder further certifies that, if it is the successful Bidder and the equipment and/or materials delivered are subsequently found to be deficient in any O.S.H.A. requirements in effect on the date of delivery, all costs necessary to bring the equipment and/or materials into compliance with the aforementioned requirements shall be borne by the Bidder.

28. NON-APPROPRIATIONS

28.1 The obligations of the Owner to make a Bid award and sign an agreement under the terms of this "Invitation to Bid" are contingent upon funds lawfully appropriated for this purpose. Should funds not be appropriated for this purpose, the Owner, at its sole discretion, shall have the right to reject all Bids.

29. FLORIDA PUBLIC RECORDS ACT AND CONTRACT CONTENT OWNERSHIP

29.1 All material submitted regarding this Bid becomes the property of the Owner. Pursuant to sec. 119.07(1), Fla. Stat., sealed Bids received by the Owner pursuant to a competitive solicitation are subject to disclosure when the Owner provides notice of an intended decision or until thirty (30) after opening of the Bids, whichever is earlier. If the Owner rejects all bids submitted in response to a competitive solicitation and the Owner concurrently provides notice of its intent to reissue the competitive solicitation, the rejected bids remain exempt from sec. 119.07(1), Fla. Stat., until such time as the Owner provides notice of an intended decision concerning the reissued competitive solicitation or until the Owner withdraws the reissued competitive solicitation. A Bid is not exempt from disclosure for longer than 12 months after the initial notice rejecting all Bids made by the Owner. Bidder should take special note of this as it relates to any proprietary information that might be included in their offer. Any resulting contract may be reviewed by any person after the contract has been executed by the Owner. The Owner has the right to use any or all information/material submitted in response to this bid and/or any resulting contract from the same. Disqualification of a Bidder does not eliminate this right.

29.2 Contractor shall comply with Florida's Public Records Laws, and, if applicable, specifically agrees to:

a) Keep and maintain public records that ordinarily and necessarily would be required by the Owner in order to perform the service.
b) Provide the public with access to public records on the same terms and conditions that the Owner would provide the records and at a cost that does not exceed the cost provided in Chapter 119, Florida Statutes, or as otherwise provided by law.

c) Ensure that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law.
d) Meet all requirements for retaining public records and transfer, at no cost, to the Owner all public records in possession of the Contractor upon termination of the Contract Documents and destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. All records stored electronically must be provided to the Owner in a format that is compatible with the information technology systems of the Owner.

END OF SECTION

BID FORM MUST BE SUBMITTED IN DUPLICATE

BIDDER: _____

PROJECT: City of Lake Worth WTP Upgrades and Improvements

DATE: _____
(Bid Submitted on)

00300
BID FORM

THIS BID IS SUBMITTED TO:

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

2. BIDDER accepts all of the terms and conditions of the Advertisement or Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for ___120___ days after the day of Bid opening. BIDDER will sign and submit the Agreement with the Bonds and other documents required by the Bidding Requirements within _15_ days after the date of OWNER's Notice of Award.

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

(a) BIDDER has examined copies of all the Bidding Documents and of the following Addenda (receipt of all which is hereby acknowledged):

Date Number

(b) BIDDER has familiarized itself with the nature and extent of the Contract Documents, Work, site, locality, and all local conditions and Laws and Regulations that in any manner may affect cost, progress, performance or furnishing of the Work.

(c) BIDDER has studied carefully all reports and drawings of subsurface conditions and drawings of physical conditions which are identified in the Division 1: General Requirements as provided in paragraph 5.03 of the Supplementary Conditions, and accepts the determination set forth in Division 1: General Conditions of the extent of the technical data contained in such reports and drawings upon which BIDDER is entitled to rely.

(d) BIDDER has obtained and carefully studied (or assumes responsibility for obtaining and carefully studying) all such examinations, investigations, explorations, tests and studies (in addition to or to supplement those referred to in (c) above) which pertain to the subsurface or physical conditions at the site or otherwise may affect the cost, progress, performance or furnishing of the Work as BIDDER considers necessary for the performance or furnishing of the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents, including specifically the provisions of paragraph 5.03 of the General Conditions, as amended by the Supplementary Conditions; and no additional examinations, investigations, explorations, tests, reports or similar information or data are or will be required by BIDDER for such purposes.

(e) BIDDER has reviewed and checked all information and data shown or indicated on the Contract Documents with respect to existing Underground Facilities at or contiguous to the site and assumes responsibility for the accurate location of said Underground Facilities. No additional examinations, investigations, explorations, tests, reports or similar information or data in respect of said Underground Facilities are or will be required by BIDDER in order to perform and furnish the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents, including specifically the provisions of paragraph 5.05 of the General Conditions.

(f) BIDDER has correlated the results of all such observations, examinations, investigations, explorations, tests, reports and studies with the terms and conditions of the Contract Documents.

(g) BIDDER has given ENGINEER written notice of all conflicts, errors or discrepancies that it has discovered in the Contract Documents and the written resolution thereof by ENGINEER is acceptable to BIDDER.

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

4. BIDDER agrees to perform all the Work described in Contract Documents, subject to adjustments as provided therein, for the Prices BIDDER provides on the Unit Price Schedule (Page 00300– 5 thru 00300–7):

5. ~~BIDDER declares it understands that the unit quantities shown on the Bid Form Unit Price Schedule are approximate only and not guaranteed and are subject to either increase or decrease; and that should the quantities of any of the items of Work be increased, the BIDDER agrees to do the additional Work at the unit prices set out herein, and should the quantities be decreased, BIDDER also understands that final payment shall be made on actual quantities completed at the unit prices, and shall make no claims for anticipated profits for any decrease in the quantities.~~ NOT USED FOR LUMP SUM CONTRACT.

6. The BIDDER further declares it understands the OWNER may elect to construct only a portion of the Work covered by these Documents and BIDDER agrees to perform that portion of the Work for which BIDDER is awarded a Contract at the unit prices quoted herein.

7. BIDDER agrees that the Work:

will be substantially complete within ___210___ calendar days after the date when the Contract Time commences to run as provided in paragraph 4.01 of the General Conditions, and completed and ready for final payment within ___240___ calendar days after the date when the Contract Time commences to run.

BIDDER accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work on time.

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

(a) Required Bid Security in the form of a Bid Bond.

(b) Schedule of Bid Items (Page(s) 00300-5 and 00300-7).

(c) Trench Safety Affidavit (Page(s) 00300-8).

(d) Schedule of Subcontractors (Page(s) 00300-9).

(e) Schedule of Suppliers, Equipment and Materials (Page(s) 00300-10)

(f) Sworn Statements Under Section 287.133(3)(a), Florida Statutes, on Public Entity Crimes (Page(s) 00300-11 and 00300-12).

(g) (List other documents as pertinent): Certification of Drug Free Workplace Program (Page(s) 00300-13).

9. Communications concerning this Bid shall be telephoned or addressed to:

The phone number and address of BIDDER indicated below.

10. The terms used in this Bid which are defined in the General Conditions of the Construction Contract included as part of the Contract Documents have the meanings assigned to them in the General Conditions.

11. BIDDER's Florida Contractor's License No. _____.

12. BIDDER covenants that it is qualified to do business in the State of Florida and has attached evidence of BIDDER's qualification to do business in the State of Florida, or if not attached, BIDDER covenants to obtain such evidence within five days of request by OWNER to provide evidence.

13. BIDDER represents that it is financially solvent and sufficiently experienced and competent to provide all goods and services required under this IFB and that all information provided in the Bid is true and correct in all respects.

14. If BIDDER is:

An Individual

By _____(SEAL)
(Individual's Name)

_____
(Signature)

doing business as _____

Business address: _____

_____

Phone No. : _____

A Partnership

By_____ (SEAL)
(Firm Name)

_____
(General Partner) (Signature)

Business address:_____

_____

Phone No. : _____

A Corporation

By _____(SEAL)
(Corporation Name)

_____
(State of Incorporation)

By _____
(Name of Person Authorized to Sign)

_____
(Title)

_____
(Signature)

(Corporate Seal)

Attest _____
(Secretary)

_____
(Signature)

Business address: _____

_____

Phone No. : _____

SCHEDULE OF BID ITEMS

All bid items shall include prices for furnishing, to the City, all materials, equipment, supplies, and all costs incurred in providing all work shown on the plans and specifications for **City of Lake Worth WTP Upgrades and Improvements.** Said costs shall be complete and inclusive of all labor, permits, inspection, taxes, bond(s), insurance, miscellaneous costs, record drawings, warranty, overhead and profit.

ITEM NO.	DESCRIPTION	EST. QUANT.	UNIT	UNIT PRICE	AMOUNT
	VOLUME NO. 1 – LIME SYSTEM UPGRADES AND IMPROVEMENTS				
1.	Mobilization and demobilization of personnel and equipment to the site including all set ups and site preparation as required to complete all Work associated with Project Plan Volume No's. 1, 2 and 3.	1	L.S.	$	$
2.	All costs to demolish the existing lime dust scrubber unit as well as all costs to supply, install, start-up, test and place into service the new dry-type lime dust collector unit. Item shall include all mechanical, structural, electrical and I&C work tasks as shown on the Drawings.	1	L.S.	$	$
3.	All costs to modify the existing volumetric lime feeder units (Total of 3) to provide additional feed rate turndown capabilities as indicated on the Drawings. Item shall include all mechanical, structural, electrical and I&C work tasks. The I&C tasks shall include all required modifications to facilitate remote monitoring, fault indication and restart/reset capabilities for the existing lime slaker units via the existing facility SCADA system.	1	L.S.	$	$
4.	All costs to demolish the existing gravity type coagulant feed system and interconnecting inlet and discharge piping. This item also includes the supply, install, start-up, testing and placing into service a new duplex, solenoid driven diaphragm feed pump skid as well as the replacement of all interconnection piping. Item shall include all mechanical, structural, electrical and I&C work tasks.	1	L.S.	$	$
5.	All costs to demolish the existing lime bin vibratory shaker units and to supply and install, start-up, test and place into service new vibratory units on each lime storage bin as shown on the Drawings. This Item also includes all mechanical, structural, electrical and I&C work tasks.	1	L.S.	$	$
6.	All costs to complete the specific structural modifications indicated on the Drawings including construction of a bulkhead wall between Lime Storage Bin No's 3 and 4, modification of the access hatches on three of the four lime storage bins as well as to supply and install new access stairs at each of the bins as shown on the Drawings.	1	L.S.	$	$
	VOLUME NO. 2 – LIME BASIN SAFETY IMPROVEMENTS				
7.	All costs to remove the existing walkway grating, clean the existing steel members for the angle seat and re-install the grating using hold down clips as shown on the Drawings.	1	L.S.	$	$

8.	All costs to clean and properly repair the surface of all steel members prior to the application of the specified coating system as shown on the Drawings.	1	L.S.	$	$
9.	All costs to demolish and properly dispose of the existing ship ladders as well as to supply and install the railing closure components as shown on the Drawings.	1	L.S.	$	$
10.	All costs to modify the existing railing systems, where indicated on the Drawings, including the removal of the temporary intermediate rail and the supply and install of a new permanent intermediate rail and kick plate.	1	L.S.	$	$
11.	All costs to supply and install self-closing type swing gates where indicated on the Drawings.	1	L.S.	$	$
12.	All costs to supply and install safety signage at the locations indicated on the Drawings.	1	L.S.	$	$

VOLUME NO. 3 – PLANT SAFETY IMPROVEMENTS

13.	All costs to supply and install the anchorage components and fixtures as well as adjustable safety netting around the existing reverse osmosis skid units as shown on the Drawings.	1	L.S.	$	$
14.	All costs to demolish and properly dispose of the existing stairway and railing systems located at the access point to the lime dust collector roof. Cost shall also include the supply and install of the proposed access stairways, railings and platform as shown on the Drawings.	1	L.S.	$	$
15.	All costs to supply and install new covers over the existing pipe trench located adjacent to the degasifier units as shown on the Drawings. Cost shall also include the surface preparation and re-coating of the existing process piping where specified.	1	L.S.	$	$
16.	All costs to supply and install new overpipe access ladders and platforms within the Pipe Gallery – Pump Room as shown on the Drawings.	1	L.S.	$	$
17.	All costs to demolish the existing railing system located on the Mezzanine Level within the Pipe Gallery – Pump Room as well as an existing ship ladder. Cost shall also include the supply and install of a new side mounted hand/guardrail system with self-closing type swing gate as shown on the Drawings.	1	L.S.	$	$
18.	All costs to supply and install a new handrail system around the northeast corner of the clearwell structure as shown on the Drawings.	1	L.S.	$	$

19.	All costs associated with the supply and installation of the proposed coiling rollup shutter systems within the limits of the second floor pedestrian bridge which connects the R.O Water Treatment Plant Building and the Filter Control/Pipe Gallery Building as shown on the Drawings.	1	L.S.	$	$
20.	All costs associated with the supply and installation of the aluminum structural components and storm panels for the proposed louver protection walls as shown on the Drawings.	1	L.S.	$	$
21.	Miscellaneous Allowance Items	1	AL	$ 20,000.00	$ 20,000.00

TOTAL BASE BID (Items 1 thru 21) **$**

PROJECT NO:

TRENCH SAFETY AFFIDAVIT

(FAILURE TO COMPLETE THIS FORM MAY RESULT IN THE BID BEING DECLARED NON-RESPONSIVE)

_____ (NAME OF CONTRACTOR) hereby provides written assurance that compliance with applicable Trench Safety Standards identified in the Occupational Safety & Health Administration's Excavation Safety Standards, (OSHA) 29 C.F.R.S. 1926.650 Subpart P will be adhered to during trench excavation in accordance with Florida Statutes 553.60 through 553.64 inclusive (1990), "Trench Safety Act".

The undersigned 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" as summarized below: (Attach additional sheets as necessary)

Schedule Item	Trench Safety Measure (Slope, Trench Shield, etc.	Cost
		$
		$
		$
		$
		$
		$
	Total	$

_____

_____

(Signature) (date)

STATE OF _____

COUNTY OF _____

Subscribed and Sworn to (or affirmed) before me on_____(date) by

_____(name). He/she is personally known to me or has

presented _____(type of identification) as identification.

_____ _____

Notary Public Signature and Seal Print Notary Name and Commission No.

SCHEDULE OF MAJOR SUBCONTRACTORS

List Proposed Major Subcontractors	Category of Work

SCHEDULE OF MAJOR EQUIPMENT AND MATERIALS

Description	Manufacturer	Model

SWORN STATEMENT UNDER SECTION 287.133(3)(a),
FLORIDA STATUTES, ON PUBLIC ENTITY CRIMES

THIS FORM MUST BE SIGNED IN THE PRESENCE OF A NOTARY PUBLIC OR OTHER OFFICER AUTHORIZED TO ADMINISTER OATHS.

1. This sworn statement is submitted to _____
   [print name of the public entity]
   by _____
   [print individual's name and title]
   for _____
   [print name of entity submitting sworn statement]

   whose business address is _____

   _____

   and (if applicable) its Federal Employer Identification Number (FEIN) is _____

   (If the entity has no FEIN, include the Social Security Number of the individual signing this sworn statement: _____.)

2. I understand that a "public entity crime" as defined in Paragraph 287.133(1)(g), Florida Statutes, means a violation of any state or federal law by a person with respect to and directly related to the transaction of business with any public entity or with an agency or political subdivision of any other state or of the United States, including, but not limited to, any bid or contract for goods or services to be provided to any public entity or an agency or political subdivision of any other state or of the United States and involving antitrust, fraud, theft, bribery, collusion, racketeering, conspiracy, or material misrepresentation.

3. I understand that "convicted" or "conviction" as defined in Paragraph 287.133(1)(b), Florida Statutes, means a finding of guilt or a conviction of a public entity crime, with or without an adjudication of guilt, in any federal or state trial court of record relating to charges brought by indictment or information after July 1, 1989, as a result of jury verdict, nonjury trial, or entry of a plea of guilty or nolo contendere.

4. I understand that an "affiliate" as defined in Paragraph 287.133(1)(a), Florida Statutes, means:

   1. A predecessor or successor of a person convicted of a public entity crime; or
   2. An entity under the control of any natural person who is active in the management of the entity and who has been convicted of a public entity crime. The term "affiliate" includes those officers, directors, executives, partners, shareholders, employees, members, and agents who are active in the management of an affiliate. The ownership by one person of shares constituting a controlling interest in another person, or a pooling of equipment or income among persons when not for fair market value under an arm's length agreement, shall be a prima facie case that one person controls another person. A person who knowingly enters into a joint venture with a person who has been convicted of a public entity crime in Florida during the preceding 36 months shall be considered an affiliate.

5. I understand that a "person" as defined in Paragraph 287.133(1)(c), Florida Statutes, means any natural person or entity organized under the laws of any state or of the United States with the legal power to enter into a binding contract and which bids or applies to bid on contracts for the provision of goods or services let by a public entity, or which otherwise transacts or applies to transact business with a public entity. The term "person" includes those officers, directors, executives, partners, shareholders, employees, members, and agents who are active in management of an entity.

6. Based on information and belief, the statement which I have marked below is true in relation to the entity submitting this sworn statement. [Please indicate which statement applies.]

_____ Neither the entity submitting this sworn statement, nor any officers, directors, executives, partners, shareholders, employees, members, or agents who are active in management of the entity, nor any affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989.

_____ The entity submitting this sworn statement, or one or more of the officers, directors, executives, partners, shareholders, employees, members, or agents who are active in management of the entity, or an affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989.

_____ The entity submitting this sworn statement, or one or more of its officers, directors, executives, partners, shareholders, employees, members, or agents who are active in the management of the entity, or an affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989. However, there has been a subsequent proceeding before a Hearing Officer of the State of Florida, Division of Administrative Hearings and the Final Order entered by the Hearing Officer determined that it was not in the public interest to place the entity submitting this sworn statement on the convicted vendor list. [attach a copy of the final order]

I UNDERSTAND THAT THE SUBMISSION OF THIS FORM TO THE CONTRACTING OFFICER FOR THE PUBLIC ENTITY IDENTIFIED IN PARAGRAPH 1 (ONE) ABOVE IS FOR THAT PUBLIC ENTITY ONLY AND, THAT THIS FORM IS VALID THROUGH DECEMBER 31 OF THE CALENDAR YEAR IN WHICH IT IS FILED. I ALSO UNDERSTAND THAT I AM REQUIRED TO INFORM THE PUBLIC ENTITY PRIOR TO ENTERING INTO A CONTRACT IN EXCESS OF THE THRESHOLD AMOUNT PROVIDED IN SECTION 287.017, FLORIDA STATUTES FOR CATEGORY TWO OF ANY CHANGE IN THE INFORMATION CONTAINED IN THIS FORM.

_____
[signature]

_____
[date]

STATE OF _____

COUNTY OF _____

Subscribed and Sworn to (or affirmed) before me on _____ by
[date]
_____. He/she is personally known to me or has presented
[name]
_____ as identification.
[type of identification]

_____ _____
[Notary's Signature and Seal] Print Notary Name and Commission No.

Form PUR 7068 (Rev. 04/10/91)
M/R 03/06/92

CERTIFICATION OF DRUG FREE WORKPLACE PROGRAM

I certify the firm of _____ maintains a drug-free workplace program, and that the following conditions are met:

1. We publish a statement notifying employees that the unlawful manufacturer, distribution, dispensing, possession, or use of a controlled substance is prohibited in the workplace and specifying that actions will be taken against employees for violations of such prohibitions.

2. We inform employees about the dangers of drug abuse in the workplace, the company'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. We give each employee engaged in providing the commodities or contractual services that are under bid a copy of the statement specified in subsection one (1).

4. In the statement specified subsection one (1) we notify the employee that; a condition of working in the commodities or contractual services that are under bid, the employee will abide by the terms of the statement and will notify the employer of any conviction of, or plea of guilty 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. We impose a sanction on, or require 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 convicted.

6. We make a good faith effort to continue to maintain a drug-free workplace through implementation of this section.

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

_____
Contractor's Signature

PROJECT: City of Lake Worth WTP Upgrades and Improvements

BIDDERS'S QUALIFICATION QUESTIONAIRE

(Include in Bid Envelope)

THE UNDERSGINED GUARANTEES THE TRUTH AND ACCURANCY OF ALL STATEMENTS AND ANSWERS HEREIN CONTAINED:

A. Any information judged by OWNER OR ENGINEER to be false is grounds for rejection of Bid and Cost Proposal. (Use additional sheets as required to provide the required information.)

B. The individual who holds the General Contractor's License certified in Florida shall be active in the management and ownership of the firm awarded the work and be available to provide their expertise for the project on an ongoing-basis. Provide the name of this individual for the complete duration of this project.

_____

C. State the numbers of years your organization has been doing business in Florida.

_____

D. State the numbers of years your organization has been doing business as a Licensed General Contractor in Florida.

E. We normally perform _____% of the work with our own forces.

List trades below:_____

_____

_____

F. Have you ever failed to complete work awarded to you? If so, state where when and why

_____

_____

_____

_____

G. BIDDER shall have performed at least five (5) similar projects which involved modifications to critical components within a municipal water treatment plant within the past five years. Provide references below:

Project #1 Name:_____

Contract Amount:_____

Owner: _____

Owner Contact: _____Phone No._____

Consultant /Engineer _____Phone No._____

Type of Well (details):_____

Total Depth:_____

Date Completed:_____

Contract Schedule (days):_____

Actual Completion Schedule:_____

Project #2 Name:_____

Contract Amount:_____

Owner: _____

Owner Contact: _____Phone No._____

Consultant /Engineer _____Phone No._____

Type of Well (details):_____

Total Depth:_____

Date Completed:_____

Contract Schedule (days):_____

Actual Completion Schedule:_____

Project #3 Name:_____

Contract Amount:_____

Owner: _____

Owner Contact: _____Phone No._____

Consultant /Engineer _____Phone No._____

Type of Well (details):_____

Total Depth:_____

Date Completed:_____

Contract Schedule (days):_____

Actual Completion Schedule:_____

Project #4 Name:_____

Contract Amount:_____

Owner: _____

Owner Contact: _____Phone No._____

Consultant /Engineer _____Phone No._____

Type of Well (details):_____

Total Depth:_____

Date Completed:_____

Contract Schedule (days):_____

Actual Completion Schedule:_____

Project #5 Name:_____

Contract Amount:_____

Owner: _____

Owner Contact: _____Phone No._____

Consultant /Engineer _____Phone No._____

Type of Well (details):_____

Total Depth:_____

Date Completed:_____

Contract Schedule (days):_____

Actual Completion Schedule:_____

H. List ALL projects within the past five years (started, underway, or completed) in which liquidated damages (LD) were incurred, either directly or indirectly (attach additional sheets as required):

Project:_____

LD Amount: _____

LD Unit Price:_____

I. BIDDER shall specifically name their proposed superintendent to be utilized on this project and shall identify the years of water treatment plant construction experience completed by the proposed superintendents within the previous five years. It must be demonstrated that the experience is with the current bidder.

Name:_____

Position:_____

Years of Experience with BIDDER:_____

Type of Work Responsible For:_____

License:_____

J. BIDDER shall provide information related to the job safety and safety rating of the corporation:

K. Please attach copies of your most recent audited financial statement.

L. Bonding Capacity:

(a) Please state your bonding capacity per project._____

(b) Please state your total bonding capacity._____

(c) Please provide name, address and contact person of your bonding company.

_____

_____

_____

M. State the true, exact, correct and complete name of the partnership, corporation or trade name under which you do business. (If corporation, state the name of the president and secretary. If a partnership, state the name of all partners. If a trade name, state the name of the individuals who do business under the trade name).

_____

(a) The business is a _____

(b) The address of the principal place of business is:_____

(c) The name of the corporate officers, or partners, or individuals doing business under a trade name are as follows:

_____

_____

If a Corporation, attach a copy of the most recent good standing certificate issued by the Secretary of State of Florida.

Date_____

Bidder:_____

By:_____

Title:_____

Mailing Address:_____

_____

END OF BIDDER'S QUALIFICATION QUESTIONNAIRE

00500
AGREEMENT

THIS AGREEMENT is dated and will be effective on the _____ day of _____ in the year 20___, by and between the City of Lake Worth (hereinafter called Owner) and _____(hereinafter called Contractor).

Owner and Contractor, in consideration of the mutual covenants hereinafter set forth, agree as follows:

ARTICLE 1. WORK.

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

VOLUME NO. 1 – LIME SYSTEM UPGRADES AND IMPROVEMENTS

- **Demolition and replacement of the existing lime bin dust scrubber unit with a dry-type dust collector unit.**
- **Modification of the existing volumetric lime feeder units (Total of 3) to provide additional lime feed rate turndown capabilities.**
- **Specific SCADA improvements to facilitate remote monitoring, fault indication and restart/reset capabilities of the existing lime slaker units (Total of 3).**
- **Demolition and replacement of the existing gravity type coagulant feed unit with a duplex, solenoid driven diaphragm metering pump skid including all interconnecting and conveyance piping.**
- **Demolition and replacement of the existing lime bin vibratory shaker units.**
- **Specific structural improvements including the construction of a bulkhead wall between Lime Storage Bin No's. 3 and 4, modification of the existing lime bin access hatches and installation of permanent bin access stairs.**

VOLUME NO. 2 – LIME BASIN SAFETY IMPROVEMENTS

- **The Work includes specific safety improvements within the limits of the lime basin structure at the City of Lake Worth Water Treatment Plant including:**
    - **Removal, cleaning and reinstallation of walkway grating sections using hold down clips.**
    - **Surface preparation and recoating of specific structural support members as shown on the Drawings.**
    - **Demolition and disposal of existing ship ladders as well as the supply and installation of railing system closure components.**
    - **Upgrade of specific sections of railing systems to three (3) rail type hand/guard rail systems.**
    - **Installation of self-closing type swing gates at specific locations shown on the Drawings.**

VOLUME NO. 3 – PLANT SAFETY IMPROVEMENTS

- **The Work includes specific safety improvements within the limits of the City of Lake Worth WTP, excluding the lime basin structure, as generally described below:**
    - **Installation of an adjustable safety netting system around each of the R.O. process skid units.**
    - **Replacement of the existing stairways and railings at the access point to the lime dust collector roof.**
    - **Installation of new trench covers adjacent to the existing degasifier units.**
    - **Installation of new overpipe access ladders and platforms within the Pipe Gallery-Pump Room and adjacent to the Degasifier Towers.**
    - **Replacement of the existing hand/guardrail system located on the Mezzanine Level of the Pipe Gallery-Pump Room as well as an existing ship ladder. Work will also include the installation of a new self-closing type swing gate.**
    - **Installation of a new hand/guardrail system around the northeast corner of the clearwell structure.**
    - **Installation of new coiling rollup shutter systems along the second floor pedestrian bridge which connects the R.O. Water Treatment Plant building to the Filter Control/Pipe Gallery building.**

The Project, of which the Work under the Contract Documents is a part, shall be referred to as: City of Lake Worth WTP Upgrades and Improvements, which includes the Front End Documents, Technical Specifications and Project Plan Volumes No. 1 through 3.

ARTICLE 2. ENGINEER

The Project has been designed by Mathews Consulting, a Division of Baxter and Woodman, Inc., 477 South Rosemary Avenue, Suite 330, West Palm Beach, Florida 33401, who is hereinafter called Engineer and who is to act as Owner's representative, assume all duties and responsibilities and have the rights and authority assigned to Engineer in the Contract Documents in connection with completion of the Work in accordance with the Contract Documents.

ARTICLE 3. CONTRACT TIME.

3.1 The Work will be substantially completed within 210 days from the date when the Contract Time commences to run as provided in paragraph 4.01 of the General Conditions and shall be finally complete and ready for final payment in accordance with paragraph 15.06 of the General Conditions within 240 days from the date when the Contract Time commences to run.

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

3.3 **LIQUIDATED DAMAGES. Owner and Contractor recognize that time is of the essence of this Agreement and that Owner will suffer financial loss if the Work is not completed within the times specified in paragraph 3.1 above, plus any extensions thereof allowed in accordance with the Contract Documents. They also recognize the delays, expense and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a**

penalty) Contractor shall pay Owner Five Hundred and 00/100 _____ dollars ($ 500.00 _____) for each day that expires after the time specified in paragraph 3.1 for Substantial Completion until the Work is substantially complete. After Substantial Completion if Contractor shall neglect, refuse or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by Owner, Contractor shall pay Owner Five Hundred and 00/100 dollars ($500.00) for each day that expires after the time specified in paragraph 3.1 for completion and readiness for final payment.

3.4 In the Owner's sole discretion, a requested extension of time may be denied for delays resulting from normal weather conditions prevailing from normal weather conditions prevailing in the area as defined by the average of the last five (5) years of weather recorded or otherwise established by the Owner.

ARTICLE 4. CONTRACT PRICE.

4.1 Owner shall pay CONTRACTOR for completion of the Work in accordance with the Contract Documents, subject to adjustment as provided therein, in current funds as follows:

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

B. For all Unit Price Work, an amount equal to the sum of the extended prices (established for each separately identified item of Unit Price Work by multiplying the unit price times the actual quantity of that item):

TOTAL OF ALL UNIT PRICES _____ ($_____)
(use words) (figures)

which is based on the Schedule of Bid Items numbered _____1_____ to __21___.

ARTICLE 5. PAYMENT PROCEDURES.

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

5.1 PROGRESS PAYMENTS. Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment as recommended by Engineer, on or about the 10th day of each month during construction as provided below. All progress payments will be on the basis of the progress of the Work measured by the schedule of values established in 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 elsewhere in the Contract Documents.

5.1.1 Prior to Substantial Completion, the total of progress payments will be made in an amount equal to the percentage indicated below, but, in each case, less the aggregate of payments previously made and less such amounts as Engineer shall determine, or Owner may withhold, in accordance with the General Conditions, less liquidated damages, if any.

90% of Work completed.

90% of materials and equipment not incorporated in the Work (but delivered, suitably stored and accompanied by documentation satisfactory to Owner as provided in the General Conditions).
95% of the work complete after the Contractor has completed over 50% of the Work.

5.1.2 Upon Substantial Completion, in an amount sufficient to increase total payments to Contractor to 98% of the Contract Price, less such amounts as Engineer shall determine, or Owner may withhold, in accordance with the General Conditions, less liquidated damages, if any.

5.2 FINAL PAYMENT. Upon final completion and acceptance of the Work in accordance with paragraph 15.06 of the General Conditions, and settlement of all claims, including liquidated damages, if any, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in said paragraph 15.06.

ARTICLE 6. INTEREST.

6.1 All payments due and not made within the time prescribed by section 218.735, Florida Statutes, shall bear interest at the rate of 1 percent per month in accordance with section 218.735, Florida Statutes, as amended from time to time.

ARTICLE 7. CONTRACTOR'S REPRESENTATIONS.

In order to induce Owner to enter into this Agreement Contractor makes the following representations:

7.1 Contractor has examined and carefully studied the Contract Documents and any data and reference items identified in the Contract Documents.

7.2 Contractor has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and is satisfied as to the general, local and Site conditions that may affect cost, progress and performance of the Work.

7.3 Contractor is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress and performance of the Work.

7.4 Contractor has studied carefully all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical data in such reports and drawings, and (2) reports and drawings related to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical data in such reports and drawings. Contractor accepts the determination set forth in the Contract Documents of the extent of the technical data contained in such reports and drawings upon which Contractor is entitled to rely, if any.

7.5 Contractor has obtained and carefully studied (or assumes responsibility for obtaining and carefully studying) all such examinations, investigations, explorations, tests, reports and studies, if any, (in addition to or to supplement those referred to in paragraph 7.4 above) which pertain to the subsurface or physical conditions at or adjacent to the Site or otherwise may affect the cost,

progress, performance or furnishing of the Work as Contractor considers necessary for the performance or furnishing of the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents; and no additional examinations, investigations, explorations, tests, reports, studies or similar information or data are or will be required by Contractor for such purposes.

7.6 Contractor has reviewed and checked all information and data shown or indicated on the Contract Documents, if any, with respect to existing Underground Facilities at or adjacent to the Site and assumes responsibility for the accurate location of said Underground Facilities. No additional examinations, investigations, explorations, tests, reports, studies or similar information or data in respect of said Underground Facilities are or will be required by Contractor in order to perform and furnish the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents.

7.7 Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress and performance of the work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (3) Contractor's safety precautions and programs.

7.8 Contractor has correlated the results of all such observations, examinations, investigations, explorations, tests, reports and studies with the terms and conditions of the Contract Documents and based on the information and observations referred to above, the Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.

7.9 Contractor has given Engineer written notice of all conflicts, errors or discrepancies that Contractor has discovered in the Contract Documents and the written resolution thereof by Engineer is acceptable to Contractor.

7.10 Contractor acknowledges that the Contract Documents are generally sufficient to indicate and convey an adequate understanding of all terms and conditions for performance and furnishing of the Work.

7.11 Contractor's entry into this Contract constitutes an incontrovertible representation by Contractor that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

7.12 Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.

ARTICLE 8. CONTRACT DOCUMENTS.

The Contract Documents which comprise the entire Agreement between Owner and Contractor concerning the Work consist of the following:

8.1 This Agreement consisting of 11 pages.

8.2 Exhibits to this Agreement identified as:

a. The Project Manual (pages____ to ____, inclusive);
b. Contractor's Bid (pages ____ to ____, inclusive);
c. Permits (pages ____ to ____, inclusive);
d. Other: _____

8.3 Performance Bond and Payment Bond consisting of ____ pages (plus Power of Attorney Forms as applicable).

8.4 Notice of Award and Notice to Proceed.

8.5 General Conditions consisting of _____ pages.

8.6 Supplementary Conditions consisting of _____ pages.

8.7 Bid documents as listed in the table of contents of the Project Manual.

8.8 Specifications consisting of _____ pages.

8.9 Drawings not attached hereto but are listed in Section 00860 List of Drawings.

8.10 Addenda numbers _____ to _____, inclusive.

8.11 Contractor's Bid consisting of _____ pages.

8.12 Documentation submitted by Contractor prior to Notice of Award.

8.13 The following which may be delivered or issued after the Effective Date of the Agreement and are not attached hereto: All Written Amendments and other documents amending, modifying, or supplementing the Contract Documents pursuant to the General Conditions.

8.14 The documents listed under Article 8 above are attached to this Agreement (except as expressly noted otherwise above).

8.15 Any other document attached hereto or incorporated herein by the Owner.

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

Governing Order of Contract Documents - The Contract Documents include various divisions, sections and conditions which are essential parts for the work to be provided by the Contractor. A requirement occurring in one is as binding as though occurring in all. They are intended to be complementary and to describe and provide for a complete work. In case of discrepancy, the following precedence will govern the interpretation of the Contract Documents prior to award of the contract.

1. Agreement
2. Addenda
3. Instructions to Bidders
4. Special Conditions
5. Supplementary Conditions

6. General Conditions
7. Technical Specifications/Drawings/Plans
8. Bid Documents

After award, Work Change Directives, Change Orders, amendments and revisions to plans and specifications will take precedence over any of the above. In case of discrepancy among technical specifications, drawings and plans, the most restrictive shall govern. Detailed plans shall have precedence over general plans. In the event that any conflicts cannot be resolved by reference to this Governing Order of Contract Documents provision, then City shall resolve the conflict in any manner which is acceptable to City and which comports with the overall intent of the Contract Documents.

ARTICLE 9. MISCELLANEOUS.

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

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

9.3 *Successors and assigns*. Owner and Contractor each binds itself, its partners, successors, assigns and legal representatives to the other party hereto, its partners, successors, assigns and legal representatives in respect of all covenants, agreements and obligations contained in the Contract Documents.

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

9.5 *Public entity crimes*. 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 Bid on a Contract to provide any goods or services to a public entity, may not submit a Bid on a Contract with a public entity for the construction or repair of a public building or public work, may not be awarded or perform Work as a Contractor, Supplier, Subcontractor, 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 287.017, Florida Statutes, for Category Two for a period of 36 months from the date of being placed on the convicted vendor list.

9.6 *Inspector General*. In accordance with Palm Beach County ordinance number 2011-009, the Contract Documents may be subject to investigation and/or audit by the Palm Beach County Inspector General. Contractor should review such ordinance in order to be aware of its rights and/or obligations under such ordinance and as applicable.

9.7 *Waiver*. Failure of either party to enforce or exercise any right(s) under the Contract Documents shall not be deemed a waiver of either party's right to enforce said right(s) at any time thereafter.

9.8 *Waiver of jury trial*. TO ENCOURAGE PROMPT AND EQUITABLE RESOLUTION OF ANY LITIGATION, EACH PARTY HEREBY WAIVES ITS RIGHTS TO A TRIAL BY JURY IN ANY LITIGATION RELATED TO THE CONTRACT DOCUMENTS.

9.9 *Independent Contractor*. The Contractor is, and shall be, in the performance of all Work under the Contract Documents, an Independent Contractor, and not an employee, agent, or servant of the Owner. All persons engaged in any of the Work performed pursuant to the Contract Documents shall at all times and in all places be subject to the Contractor's sole direction, supervision and control.

9.10 *Access and audits*. The Contractor shall maintain adequate records to justify all charges, expenses, and costs incurred in estimating and performing the Work for at least five (5) years after final payment is made. The Owner shall have access to such books, records, and documents as required for the purpose of inspection or audit during normal business hours at the Contractor's place of business. Under no circumstances will Contractor be required to disclose any confidential or proprietary information regarding its products and service costs.

9.11 *Preparation.* The Contract Documents shall not be construed more strongly against either party regardless of who was more responsible for its preparation.

9.12 *Public Records Law.* Contractor shall comply with Florida's Public Records Laws, and specifically agrees to:

a) Keep and maintain public records required by the Owner to perform the service.

b) Upon request from the Owner's custodian of public records, provide the Owner with a copy of the requested records or allow the records to be inspected or copied within a reasonable time at a cost that does not exceed the cost provided in Chapter 119, Florida Statutes or as otherwise provided by law.

c) Ensure that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law for the duration of the contract term and following completion of the contract if the Contractor does not transfer the records to the Owner.

d) Upon completion of the contract, transfer, at no cost, to the Owner all public records in possession of the Contractor or keep and maintain public records required by the Owner to perform the service. If the Contractor transfers all public records to the Owner 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 Owner, upon request from the Owner's custodian of public records, in a format that is compatible with the information technology systems of the Owner.

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 AGREEMENT, CONTACT THE CUSTODIAN OF PUBLIC RECORDS OR DESIGNEE AT: ATTENTION DEBBIE ANDREA, (561) 586-1660 OR DANDREA@LAKEWORTH.ORG OR 7 NORTH DIXIE HIGHWAY, LAKE WORTH, FL 33460.

9.13 *Enforcement costs.* If any legal action or other proceeding is brought for the enforcement of the Contract Documents, or because of an alleged dispute, breach, default or misrepresentation in connection with any provisions of the Contract Documents, the parties agree that each party shall be responsible for its own attorney's fees.

9.14 *Binding authority.* Contractor's representative below has full power, authority and legal right to execute and deliver these Contract Documents and perform all of its obligations under the Contract Documents. By signing the Contract Documents, the representative hereby represents to the Owner that he/she has the authority and full legal power to execute the Contract Documents and any and all documents necessary to effectuate and implement the terms of the Contract Documents on behalf of the party for whom he or she is signing and to bind and obligate such party with respect to all provisions contained in the Contract Documents.

9.15 *Assignment of warranties.* Contractor shall assign to Owner all warranties extended to Contractor by material suppliers. If an assignment of warranty requires the material supplier to consent to same, then Contractor shall secure the material supplier's consent to assign said warranties to Owner.

9.16 *Contractor's certifications.* Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract Documents. For the purposes of this paragraph:

1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process or in the Contract execution;

2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract Documents to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and

4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract Documents.

9.17 *Construction defects.* PURSUANT TO SECTION 558.005, FLORIDA STATUTES, ANY CLAIMS FOR CONSTRUCTION DEFECTS ARE NOT SUBJECT TO THE NOTICE AND CURE PROVISIONS OF CHAPTER 558, FLORIDA STATUTES.

9.18 *Delays; Contractor's remedies.* NOTHWITHSTANDING ANY PROVISION ELSEWHERE IN THE CONTRACT DOCUMENTS, NO CLAIM FOR DAMAGES OR ANY CLAIM OTHER THAN FOR AN EXTENSION OF TIME SHALL BE MADE OR ASSERTED AGAINST OWNER BY REASON OF ANY DELAYS. Contractor shall not be entitled to an increase in the

Contract Price or payment or compensation of any kind from Owner for direct, indirect, consequential, impact or other costs, expenses or damages, including, but not limited to, costs of acceleration or inefficiency, arising because of delay, disruption, interference, or hindrance, be it reasonable or unreasonable, foreseeable or avoidable or unavoidable. Contractor shall be entitled only to extensions of the Contract Time as the sole and exclusive remedy for such resulting delays, in accordance with and the extent specifically provided herein.

REMAINDER OF THIS PAGE INTENTIONALLY LEFT BLANK
SIGNATURE PAGE FOLLOWS

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

CITY OF LAKE WORTH, FLORIDA

By: _____
Pam Triolo, Mayor

ATTEST

_____
Pamela J. Lopez, City Clerk

Approved as to form and legal sufficiency:

_____
Glen J. Torcivia, City Attorney

CONTRACTOR: _____

By: _____

Print Name: _____

Title: _____

[Corporate Seal]

STATE OF _____)
COUNTY OF _____)

The foregoing instrument was acknowledged before me this _____ day of _____, 2016 by_____, as _____ of _____, Inc., a Florida corporation, and who is personally known to me or who has produced the following _____ as identification.

Notary Public:

_____

PROJECT: City of Lake Worth WTP Upgrades and Improvements

00501
OPINION OF ATTORNEY

This is to certify that I have examined the attached Contract Documents, that after such examination I am of the opinion that the execution of the Agreement, the Performance Bond and Payment Bond are in due and proper form.

_____
Attorney for Owner

This the _____ day of _____, 20_____.

Construction Performance Bond

Bond Number:

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

CONTRACTOR (Name & Address):

SURETY (Name & Principal Place of Business):

OWNER (Name & Address):

City of Lake Worth
7 North Dixie Highway
Lake Worth, FL. 33460

CONTRUCTION CONTRACT
Date
Amount:
Description (Name & Location): Lake Worth WTP Upgrades and Improvements, City of Lake Worth, FL

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

CONTRACTOR AS PRINCIPAL
Company:

Signature:_____
Name & Title:

SURETY
Company:

Signature:_____
Name & Title:

EJCDC No. 1910-28A (1984 Edition)
Prepared through the joint efforts of The Surety Association of America, Engineers' Joint Contract Documents Committee, The Associated General Contractor of America, and the American Institute of Architects.

1. The Contractor and the Surety, jointly and severally, bind themselves their heir; executors, administrators, successors and assigns to the owner to pay for labor. Materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference.
2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except to participate in conferences as provided in Subparagraph 3.1.
3. If there is no Owner Default, the Surety's obligation under this Bond shall arise after:
   3.1. The Owner has notified the Contractor and Surety at its address described in Paragraph 10 below, that the Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with the Contractor and the Surety to be held not later than fifteen days after receipt of such notice to discuss methods of performance the Construction Contract. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall be waive the Owner's right. If any, subsequently to declare a Contractor Default: and
   3.2. The Owner has declared a Contractor Default and formally terminated the Contractor's right to compete the contract. Such Contactor Default shall not be declared earlier than twenty days after the Contractor and the Surety have received notice as provided in Subparagraph 3.1: and
   3.3. The Owner has agreed to pay the Balance of the Contract Price to the Surety in accordance with the terms of the Construction Contract or to a contractor selected to perform the Construction Contract in accordance with the terms of the contract with the Owner.
4. When the Owner has satisfied the conditions of Paragraph 3. The Surety shall promptly and at the Surety's expense take one of the following actions:
   4.1. Arrange for the Contractor with consent of the Owner to perform and complete the Construction Contractor
   4.2. Undertake to perform and complete the Construction Contract itself, through its agents or through independent contractors; or
   4.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract , arrange for a contract to be prepared for execution by the Owner and the contractor selected with the Owner's concurrence to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract and pay to the Owner the amount of damages as described in Paragraph 6 in excess of the Balance of the Contract Price incurred by the Owner resulting from the Contractor's default: or
   4.4. Waive its right to perform and complete arrange for completion or obtain a new contractor and with reasonable promptness under circumstances:
      1. After investigation determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined tender payment therefor to the Owner; or
      2. Deny liability in whole or in part and notify the Owner citing reasons therefor.
5. If the Surety does not proceed as provided in Paragraph 4 with reason-able promptness. The Surety shall be deemed to be in default on this Bond fifteen days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Subparagraph 4.4. And the Owner refuses the payment tendered or the Surety has denied liability in whole or in part without further notice the Owner shall be entitled to enforce any remedy available to the Owner.
6. After the Owner has terminated the Contractor's right to complete the Construction Contract and if the Surety elects to act under Subparagraph 4.1. 4.2. or 4.3. above then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. To the limit of the amount of this Bond but subject to commitment by the Owner of the Balance of the Contract Price to mitigation of costs and damages on the Construction Contract the Surety is obligated without Duplication for:
   6.1. The responsibilities of the Contractor for correction of defective work and completion of the Construction Contract:
   6.2. Additional legal including appellate proceedings, design professional and delay costs and expenses resulting from the Contractor's default, and resulting from the actions or failure to act of the Surety under paragraph 4; and
   6.3. Liquidated damages. Or if no liquidated damages are specified in the Construction Contract actual damages caused by delayed performance or non-performance of the Contractor.
7. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heir's executors, administrators or successors.
8. The Surety hereby waives notice of any change including changes of time to the Construction Contract or to related subcontracts, purchase orders and other obligation.
9. Any proceeding, legal or equitable under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after Contactor Default or within two years after the Contactor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.
10. Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the signature page.
11. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted here from and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The Intent is that this Bond shall be construed as a statutory bond and not as a common law bond.
12. Definitions.
    12.1. Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled. Reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.
    12.2. Construction Contract: The agreement between the Owner and the Contractor identified on the signature page. Including all Contract Documents and changes thereto.
    12.3. Contractor Default: Failure of the Contractor which has neither been remedied nor waived to perform or otherwise to comply with the terms of the Construction Contract.
    12.4. Owner Default: Failure of the Owner, which has neither been remedied nor waived to pay the Contractor as required by the Construction Contract or to perform and complete or comply with the other terms thereof.

This Bond is executed pursuant to Florida Statutes Section 255.05 or Section 713.23, whichever is applicable, and is subject to the notice and time limitation provisions.

(FOR INFORMATION ONLY- Name, Address and Telephone)

AGENT OR BROKER:

OWNER'S REPRESENTATIVE (ENGINEER):

Mathews Consulting, Inc.
477 S. Rosemary Ave., Suite 330
West Palm Beach, FL 33401

Construction Payment Bond

Bond Number:

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

CONTRACTOR (Name & Address):

SURETY (Name & Principal Place of Business):

OWNER (Name & Address):

City of Lake Worth
7 North Dixie Highway
Lake Worth, FL. 33460

CONTRUCTION CONTRACT
Date
Amount:
Description (Name & Location): Lake Worth WTP Upgrades and Improvements, City of Lake Worth, FL

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

CONTRACTOR AS PRINCIPAL
Company:

Signature: _____
Name & Title:

SURETY
Company:

Signature: _____
Name & Title:

EJCDC No. 1910-28B (1984 Edition)
Prepared through the joint efforts of The Surety Association of America, Engineers' Joint Contract Documents Committee, The Associated General Contractor of America, and the American Institute of Architects, American Subcontractors Association, and the Associated Specialty Contractor

1. The Contractor and the Surety, jointly and severally, bind themselves their heir; executors, administrators, successors and assigns to the owner to pay for labor. Materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference.

2. With respect to the Owner, this obligation shall be null and void if the Contractor:
   2.1. Promptly makes payment, directly or indirectly for all sums due Claimants and
   2.2. Defends indemnifies and holds harmless the Owner from all claims demands liens or suits by any person or entity who furnished labor, materials or equipment for use in the performance of Construction Contract provided the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 12) of any claims, demands liens or suits to the Contractor and the Surety and provided there is no Owner Default.
3. With respect to Claimants this obligation shall be null and void if the Contractor promptly makes payment directly or indirectly for all sums due.
4. The Surety shall have no obligation to Claimants under this Bond until:
   4.1 Claimants who are employed by or have a direct contact with the Contractor have given notice to the Surety (at the address described in Paragraph 12) and sent a copy or notice thereof to the Owner stating that a claim is being made under this Bond and with substantial accuracy the amount of the claim (see note one)
   4.2 Claimants who do not have a direct contract with the Contractor
      1. Have furnished written notice to the Contractor and sent a copy or notice thereof, to the Owner within 90 days after having last preformed labor or last furnished materials or equipment included in the claim stating with substantial accuracy the amount of the claim and the name of the party to whom the materials were furnished or supplied or for whom the labor was done or preformed and
      2. Have either received a rejection in whole or in part from the Contractor or not received within 30 days of furnishing the above notice any communication from the Contractor by which the Contractor has indicated the claim will be paid directly or indirectly and
      3. Not having been paid within the above 30 days have sent a written notice to the Surely (at address described in Paragraph 12) and sent a copy or notice thereof to the Owner stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to the Contractor
5. If a notice required by Paragraph 4 is given by the Owner to the Contractor or to the Surety that is sufficient compliance.
6. When the Claimant has satisfied the conditions of Paragraph 4 the Surety shall promptly and at the Surety's expense take the following actions:
   6.1. Send an answer to the Claimant, with a copy to the Owner, within 45 days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.
   6.2 Pay or arrange for payment of any undisputed amounts of this Bond, and the amount of this Bond shall be credited for any payment made in good faith by the Surety.
7. The Surety's total obligation shall not exceed the amount of this Bond and the amount of this Bond shall be credited for any payments made in good faith by the Surety.
8. Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims. If any, under any Construction Performance Bond By the Contractor furnishing and the Owner accepting this Bond they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and the Surety under this Bond subject to the Owner's priority to use the funds for the completion of the work.
9. The surety shall not be liable to the Owner Claimants or others for Obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for payment of any costs or expense of any Claimant under this Bond and shall have under this Bond no obligations to make payments to give notice on behalf of or otherwise have obligations to Claimants under this Bond.
10. The Surety hereby waives notice of any change, including changes at time to the Construction Contract or to related subcontracts purchase orders and other obligations.
11. No Suit or actions shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the work or part of the work is located or after the expiration of 2 year from the date (1) on which the Claimant gave the notice required by Subparagraph 4.1 or Clause 4.2 (iii) , or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.
12. Notice to the Surety the Owner or the Contractor shall be mailed or delivered to the address shown on the signature page. Actual receipt of notice by Surety the Owner or the Contractor however accomplished shall be sufficient compliance as of the date received at the address shown on the signature page.
13. When this Bond has been furnished to comply with statutory or other legal requirements in the location where the construction was to be performed any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted here from and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is that this Bond shall be constructed as a statutory bond and not as a common law bond.
14. Upon request by any person or entity appearing to be a potential beneficiary of this Bond the Contractor shall promptly furnish a copy of this Bond or shall permit a copy to be made
15. DEFINITIONS
   15.1. Claimant: An individual or entity having a direct contract with the Contractor or with a subcontractor to furnish labor, materials or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms " labor materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor materials or equipment were furnished.
   15.2. Construction Contract: The agreement between the Owner and the Contractor identified on the signature page, including all Contract Documents and changes thereto.
   15.3. Owner Default: Failure of the Owner, which has neither been remedied nor waived, to pay the Contractor as required by the Construction Contract or to perform and complete or comply with the other terms thereof.

Note 1: As an additional requirement any claimant, except a laborer, who is not in privity with the Contractor shall, within forty-five days after beginning to furnish labor, materials or supplies, furnish the Contractor with a Notice that he intends to look to the Bond for protection.

This Bond is executed pursuant to Florida Statues Section 255.05 or Section 713.23, whichever is applicable, and us subject to the notice and time limitation provisions.

(FOR INFORMATION ONLY- Name, Address and Telephone)

AGENT OR BROKER:

OWNER'S REPRESENTATIVE (ENGINEER):

Mathews Consulting, Inc.
477 S. Rosemary Ave., Suite 330
West Palm Beach, FL 33401

SECTION 00630
NOTICE OF COMPLIANCE WITH CHAPTER 556, FLORIDA STATUTES

The undersigned Contractor does hereby confirm to the Owner and Engineer that the Contractor has reviewed the provisions of Chapter 556, Florida Statutes, and has provided to "Sunshine State One-Call of Florida, Inc." the information required under F.S. 556.105 before the commencement of any excavation or demolition required for the Work.

Executed this _____ day of _____, 20____.

_____
(Name of Contractor)

_____
(Signature)

_____
(Print Name)

_____
(Title)

END OF SECTION

PROJECT: City of Lake Worth WTP Upgrades and Improvements

00670
CONTRACTOR'S AFFIDAVIT TO OWNER

STATE OF FLORIDA
COUNTY OF _____

Before me, the undersigned authority, authorized to administer oaths and take acknowledgements, personally appeared _____, who, being by me first duly sworn, on oath depose(s) and say(s):

(1) He/she is/They are a (Corporation, Partnership or Individual) of _____(State), doing business as _____(Company Name), hereinafter called "Contractor".

(2) Contractor heretofore entered into a Contract with _____ hereinafter called "Owner" to do Work (furnish material, labor and services) for the construction of _____, located at _____County, Florida. ".

(3) Contractor has fully completed construction in accordance with the terms of the Contract, and all lienors have been paid in full, except:

NAME OF LIENOR	AMOUNT DUE AND UNPAID
	$

(4) All Workmen's Compensation claims have been settled and no liability claims are pending, in connection with, arising out of or resulting from the Contract.

(5) Receipt by the Contractor of the final payment, under the aforementioned Contract, shall constitute a full release and discharge by the Contractor to the Owner of any and all claims of the Contractor against the Owner, arising out of, connected with, or resulting from performance of the obligations of the Contractor pursuant to the Contract Documents.

(6) The term "lienor" as used in this affidavit means any person having a lien or a prospective lien, under the Mechanics Lien Law of Florida, on the land and property of the Owner referred to in paragraph (2) of this affidavit..

(7) This affidavit is given pursuant to the provisions of Florida Statutes Section 713.06 or Section 255.05, whichever is applicable.
Signed and sealed in the presence of:

_____ _____
(ENTITY)
_____ By:_____
(SEAL)

Subscribed and Sworn to (or affirmed) before me on _____(date) by _____ _____(name). He/she is personally known to me or has presented _____(type of identification) as identification.

_____ _____
Notary Public Signature and Seal Print Notary Name and Commission No.

00680
APPLICATION FOR PAYMENT NO. _____

Project _____

Application is made for payment, as hereinafter shown, in connection with this Agreement:

Total Work to Date - see attached schedule	$ _____
Total Material Suitably Stored - see attached schedule	$ _____
Gross Amount Due	$ _____
Less _____ % Retainage	$ _____
Amount Due to Date	$ _____
Less Previous Applications	$ _____
Amount Due This Application	$ _____

Original Contract Price	$ _____
Net Change Orders	$ _____
Current Contract Price	$ _____
Value of Work Remaining to be Done	$ _____

Contractor's Certification:
The undersigned Contractor certifies that (1) all previous progress payments received from Owner on account of Work done under the Agreement referred to above have been applied to discharge in full all obligations of Contractor incurred in connection with Work covered by prior Applications for Payment numbered 1 through _____, inclusive; and (2) title to all materials and equipment incorporated in said Work or otherwise listed in or covered by this Application for Payment will pass to Owner at time of payment free and clear of all liens, claims, security interests and encumbrances (except such as covered by Bond acceptable to Owner).

Dated _____, 20____

_____
Contractor and Mailing Address

By _____
(Name and Title)

State of)
County of)ss

Subscribed and Sworn to (or affirmed) before me on _____ *(date)* personally appeared _____ *(name)*. He/she is personally known to me or has presented _____ _____ *(type of identification)* as identification. Who being so duly sworn, did depose and say that he/she is _____ of the Contractor above mentioned; that he/she executed the above Application for Payment and statement on behalf of said Contractor; and that all of the statements contained therein are true, correct and complete.

_____ _____
Notary Public Signature and Seal Print Notary Name and Commission No.

Payment of the above AMOUNT DUE THIS APPLICATION is recommended.

MATHEWS CONSULTING, INC.

Date: _____ By: _____
(Name) (Title)

CITY OF LAKE WORTH

Date: _____ By_____
(Name) (Title)

SECTION 0700

GENERAL CONDITIONS

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

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

EJCDC®

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

Issued and Published Jointly by

ACEC

AMERICAN COUNCIL OF ENGINEERING COMPANIES

ASCE

AMERICAN SOCIETY OF CIVIL ENGINEERS

National Society of Professional Engineers®

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To prepare supplementary conditions that are coordinated with the General Conditions, use EJCDC's Guide to the Preparation of Supplementary Conditions (EJCDC® C-800, 2013 Edition). The full EJCDC Construction series of documents is discussed in the Commentary on the 2013 EJCDC Construction Documents (EJCDC® C-001, 2013 Edition).

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

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

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

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

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

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

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

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

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

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

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

10. *Claim*—(a) A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein: seeking an adjustment of Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract; or (b) a demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal; or seeking resolution of a contractual issue that Engineer

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

11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. ("CERCLA"); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§5501 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq. ("RCRA"); (d) the Toxic Substances Control Act, 15 U.S.C. §§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other federal, state, or local statute, law, rule, regulation, ordinance, resolution, code, order, or decree regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.

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

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

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

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

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

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

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

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

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

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

22. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated in the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, does not establish a Hazardous Environmental Condition.

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

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

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

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

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

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

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

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

31. *Project Manual*—The written documents prepared for, or made available for, procuring and constructing the Work, including but not limited to the Bidding Documents or other construction procurement documents, geotechnical and existing conditions information, the Agreement, bond forms, General Conditions, Supplementary Conditions, and Specifications. The contents of the Project Manual may be bound in one or more volumes.

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

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

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

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

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

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

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

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

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

41. *Successful Bidder*—The Bidder whose Bid the Owner accepts, and to which the Owner makes an award of contract, subject to stated conditions.

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

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

44. *Technical Data*—Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (a) subsurface conditions at the Site, or physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) or (b) Hazardous Environmental Conditions at the Site. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then the data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made available to Contractor are hereby defined as Technical Data with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06.

45. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including but not limited to those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, fiber optic transmissions, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

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

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

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

1.02 *Terminology*

A. The words and terms discussed in the following paragraphs are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. *Intent of Certain Terms or Adjectives*:

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

C. *Day*:

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

D. *Defective*:

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

a. does not conform to the Contract Documents; or

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

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

E. *Furnish, Install, Perform, Provide*:

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

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

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

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

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

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

A. *Bonds*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.

B. *Evidence of Contractor's Insurance*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract), the certificates and other evidence of insurance required to be provided by Contractor in accordance with Article 6.

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

2.02 *Copies of Documents*

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

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

2.03 *Before Starting Construction*

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

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

2. a preliminary Schedule of Submittals; and

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

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

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

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

2.05 *Initial Acceptance of Schedules*

A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.03.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.

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

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

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

2.06 *Electronic Transmittals*

A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may transmit, and shall accept, Project-related correspondence, text, data, documents, drawings, information, and graphics, including but not limited to Shop Drawings and other submittals, in electronic media or digital format, either directly, or through access to a secure Project website.

B. If the Contract does not establish protocols for electronic or digital transmittals, then Owner, Engineer, and Contractor shall jointly develop such protocols.

C. When transmitting items in electronic media or digital format, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the recipient's use of software application packages, operating systems, or

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computer hardware differing from those used in the drafting or transmittal of the items, or from those established in applicable transmittal protocols.

ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

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

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

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

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

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

3.02 *Reference Standards*

A. Standards Specifications, Codes, Laws and Regulations

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

2. No provision of any such standard specification, manual, reference standard, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*:

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

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error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.

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

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

B. *Resolving Discrepancies*:

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

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

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

3.04 *Requirements of the Contract Documents*

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

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

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

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3.05 *Reuse of Documents*

A. Contractor and its Subcontractors and Suppliers shall not:

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

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

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

ARTICLE 4 – COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

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

4.02 *Starting the Work*

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

4.03 *Reference Points*

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

4.04 *Progress Schedule*

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

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

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

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

4.05 *Delays in Contractor's Progress*

A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Times and Contract Price. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

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

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

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

2. abnormal weather conditions;

3. acts or failures to act of utility owners (other than those performing other work at or adjacent to the Site by arrangement with the Owner, as contemplated in Article 8); and

4. acts of war or terrorism.

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

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

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

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G. Contractor must submit any Change Proposal seeking an adjustment in Contract Price or Contract Times under this paragraph within 30 days of the commencement of the delaying, disrupting, or interfering event.

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

5.01 *Availability of Lands*

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

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

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

5.02 *Use of Site and Other Areas*

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

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

2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.12, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or at law; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part

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by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.

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

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

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

5.03 *Subsurface and Physical Conditions*

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

1. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site;

2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities); and

3. Technical Data contained in such reports and drawings.

B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

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

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

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

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5.04 *Differing Subsurface or Physical Conditions*

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

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

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

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

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

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

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

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

D. *Possible Price and Times Adjustments*:

1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, or both, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

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

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

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c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

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

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

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

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

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

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

5.05 *Underground Facilities*

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

1. Owner and Engineer do not warrant or guarantee the accuracy or completeness of any such information or data provided by others; and

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

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

b. locating all Underground Facilities shown or indicated in the Contract Documents as being at the Site;

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

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

B. *Notice by Contractor*: If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, then Contractor shall, promptly after

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becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.

C. *Engineer's Review*: Engineer will promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the Underground Facility in question; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and advise Owner in writing of Engineer's findings, conclusions, and recommendations. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

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

E. *Possible Price and Times Adjustments*:

1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, or both, to the extent that any existing Underground Facility at the Site that was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

   a. Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated the existence or actual location of the Underground Facility in question;

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

   c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times; and

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

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

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

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5.06 *Hazardous Environmental Conditions at Site*

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

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

2. Technical Data contained in such reports and drawings.

B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:

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

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

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

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

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

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

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

G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off.

H. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.

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

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

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

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ARTICLE 6 – BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

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

B. All bonds shall be in the form prescribed by the Contract except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (as amended and supplemented) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.

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

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

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

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

6.02 *Insurance—General Provisions*

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

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

C. Contractor shall deliver to Owner, with copies to each named insured and additional insured (as identified in this Article, in the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Contractor has obtained and is

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maintaining the policies, coverages, and endorsements required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

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

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

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

G. If Contractor has failed to obtain and maintain required insurance, Owner may exclude the Contractor from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 16.

H. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price shall be adjusted accordingly.

I. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests.

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

6.03 *Contractor's Insurance*

A. *Workers' Compensation*: Contractor shall purchase and maintain workers' compensation and employer's liability insurance for:

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

2. United States Longshoreman and Harbor Workers' Compensation Act and Jones Act coverage (if applicable).

3. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees (by stop-gap endorsement in monopolist worker's compensation states).

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4. Foreign voluntary worker compensation (if applicable).

B. *Commercial General Liability—Claims Covered*: Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against:

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

2. claims for damages insured by reasonably available personal injury liability coverage.

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

C. *Commercial General Liability—Form and Content*: Contractor's commercial liability policy shall be written on a 1996 (or later) ISO commercial general liability form (occurrence form) and include the following coverages and endorsements:

1. Products and completed operations coverage:

   a. Such insurance shall be maintained for three years after final payment.

   b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.

2. Blanket contractual liability coverage, to the extent permitted by law, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.

3. Broad form property damage coverage.

4. Severability of interest.

5. Underground, explosion, and collapse coverage.

6. Personal injury coverage.

7. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together); or CG 20 10 07 04 and CG 20 37 07 04 (together); or their equivalent.

8. For design professional additional insureds, ISO Endorsement CG 20 32 07 04, "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.

D. *Automobile liability*: Contractor shall purchase and maintain automobile liability insurance against claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy shall be written on an occurrence basis.

E. *Umbrella or excess liability*: Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the paragraphs above. Subject to industry-standard exclusions, the coverage afforded shall follow form as to each and every one of the underlying policies.

F. *Contractor's pollution liability insurance*: Contractor shall purchase and maintain a policy covering third-party injury and property damage claims, including clean-up costs, as a result

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of pollution conditions arising from Contractor's operations and completed operations. This insurance shall be maintained for no less than three years after final completion.

G. *Additional insureds*: The Contractor's commercial general liability, automobile liability, umbrella or excess, and pollution liability policies shall include and list as additional insureds Owner and Engineer, and any individuals or entities identified in the Supplementary Conditions; include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds; and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby (including as applicable those arising from both ongoing and completed operations) on a non-contributory basis. Contractor shall obtain all necessary endorsements to support these requirements.

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

I. *General provisions*: The policies of insurance required by this Paragraph 6.03 shall:

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

J. The coverage requirements for specific policies of insurance must be met by such policies, and not by reference to excess or umbrella insurance provided in other policies.

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6.04 *Owner's Liability Insurance*

A. In addition to the insurance required to be provided by Contractor under Paragraph 6.03, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

B. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.

6.05 *Property Insurance*

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

1. include the Owner and Contractor as named insureds, and all Subcontractors, and any individuals or entities required by the Supplementary Conditions to be insured under such builder's risk policy, as insureds or named insureds. For purposes of the remainder of this Paragraph 6.05, Paragraphs 6.06 and 6.07, and any corresponding Supplementary Conditions, the parties required to be insured shall collectively be referred to as "insureds."

2. be written on a builder's risk "all risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire; lightning; windstorm; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; flood; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; water damage (other than that caused by flood); and such other perils or causes of loss as may be specifically required by the Supplementary Conditions. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance may be provided through other insurance policies acceptable to Owner and Contractor.

3. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.

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

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5. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).
6. extend to cover damage or loss to insured property while in transit.
7. allow for partial occupation or use of the Work by Owner, such that those portions of the Work that are not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
8. allow for the waiver of the insurer's subrogation rights, as set forth below.
9. provide primary coverage for all losses and damages caused by the perils or causes of loss covered.
10. not include a co-insurance clause.
11. include an exception for ensuing losses from physical damage or loss with respect to any defective workmanship, design, or materials exclusions.
12. include performance/hot testing and start-up.
13. be maintained in effect, subject to the provisions herein regarding Substantial Completion and partial occupancy or use of the Work by Owner, until the Work is complete.

B. *Notice of Cancellation or Change*: All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 6.05 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured.

C. *Deductibles*: The purchaser of any required builder's risk or property insurance shall pay for costs not covered because of the application of a policy deductible.

D. *Partial Occupancy or Use by Owner*: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide notice of such occupancy or use to the builder's risk insurer. The builder's risk insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy; rather, those portions of the Work that are occupied or used by Owner may come off the builder's risk policy, while those portions of the Work not yet occupied or used by Owner shall remain covered by the builder's risk insurance.

E. *Additional Insurance*: If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.05, it may do so at Contractor's expense.

F. *Insurance of Other Property*: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, such as tools, construction equipment, or other personal property owned by Contractor, a Subcontractor, or an employee of Contractor or a Subcontractor, then the entity or individual owning such property item will be responsible for deciding whether to insure it, and if so in what amount.

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6.06 *Waiver of Rights*

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

B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for:

1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and

2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06.

C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 6.06.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them.

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

6.07 *Receipt and Application of Property Insurance Proceeds*

A. Any insured loss under the builder's risk and other policies of insurance required by Paragraph 6.05 will be adjusted and settled with the named insured that purchased the

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policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.

B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.05 shall distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.

C. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the money so received applied on account thereof, and the Work and the cost thereof covered by Change Order, if needed.

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

7.01 *Supervision and Superintendence*

A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.

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

7.02 *Labor; Working Hours*

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

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

7.03 *Services, Materials, and Equipment*

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

B. All materials and equipment incorporated into the Work shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and

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guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

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

7.04 *"Or Equals"*

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

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

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

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

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

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

4) it is not objectionable to Owner.

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

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

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

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

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

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

E. *Treatment as a Substitution Request*: If Engineer determines that an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer considered the proposed item as a substitute pursuant to Paragraph 7.05.

7.05 *Substitutes*

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

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

2. The requirements for review by Engineer will be as set forth in Paragraph 7.05.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.

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

a. shall certify that the proposed substitute item will:

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

2) be similar in substance to that specified, and

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

b. will state:

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

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

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

c. will identify:

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

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

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

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

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

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

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

F. *Effect of Engineer's Determination*: If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.05.D, by timely submittal of a Change Proposal.

7.06 *Concerning Subcontractors, Suppliers, and Others*

A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner.

B. Contractor shall retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of designated parts of the Work if required by the Contract to do so.

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

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

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

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

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

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

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

J. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors, Suppliers, and all other individuals or entities performing or furnishing any of the Work.

K. Contractor shall restrict all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed herein.

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

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

N. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by the particular Subcontractor or Supplier.

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O. Nothing in the Contract Documents:

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

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

7.07 *Patent Fees and Royalties*

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

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

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

7.08 *Permits*

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

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7.09 *Taxes*

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

7.10 *Laws and Regulations*

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

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

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

7.11 *Record Documents*

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

7.12 *Safety and Protection*

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

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

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

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

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

C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.

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

E. All damage, injury, or loss to any property referred to in Paragraph 7.12.A.2 or 7.12.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

F. Contractor's duties and responsibilities for safety and protection shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 15.06.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

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

7.13 *Safety Representative*

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

7.14 *Hazard Communication Programs*

A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or

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exchanged between or among employers at the Site in accordance with Laws or Regulations.

7.15 *Emergencies*

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

7.16 *Shop Drawings, Samples, and Other Submittals*

A. *Shop Drawing and Sample Submittal Requirements*:

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

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

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

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

d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.

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

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

B. *Submittal Procedures for Shop Drawings and Samples*: Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals. Each submittal will be identified as Engineer may require.

1. *Shop Drawings*:

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

b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to

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provide and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.D.

2. *Samples*:

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

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

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

C. *Other Submittals*: Contractor shall submit other submittals to Engineer in accordance with the accepted Schedule of Submittals, and pursuant to the applicable terms of the Specifications.

D. *Engineer's Review*:

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

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

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

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

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

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

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

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

E. *Resubmittal Procedures*:

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

2. Contractor shall furnish required submittals with sufficient information and accuracy to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing a fourth or subsequent submittal of a Shop Drawings, sample, or other item requiring approval, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges.

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

7.17 *Contractor's General Warranty and Guarantee*

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on Contractor's warranty and guarantee.

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

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

2. normal wear and tear under normal usage.

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

1. observations by Engineer;

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

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

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

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

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

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

8. any correction of defective Work by Owner.

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

7.18 *Indemnification*

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

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

C. The indemnification obligations of Contractor under Paragraph 7.18.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:

1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or

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

7.19 *Delegation of Professional Design Services*

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

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

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Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

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

D. Pursuant to this paragraph, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 7.16.D.1.

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

ARTICLE 8 – OTHER WORK AT THE SITE

8.01 *Other Work*

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

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

C. Contractor shall afford each other contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.

D. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 8, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

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8.02 *Coordination*

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

1. the identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;
2. an itemization of the specific matters to be covered by such authority and responsibility; and
3. the extent of such authority and responsibilities.

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

8.03 *Legal Relationships*

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

B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due to Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this paragraph.

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

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

ARTICLE 9 – OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

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

9.02 *Replacement of Engineer*

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

9.03 *Furnish Data*

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

9.04 *Pay When Due*

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

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

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

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

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

9.06 *Insurance*

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

9.07 *Change Orders*

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

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9.08 *Inspections, Tests, and Approvals*

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

9.09 *Limitations on Owner's Responsibilities*

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

9.10 *Undisclosed Hazardous Environmental Condition*

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

9.11 *Evidence of Financial Arrangements*

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

9.12 *Safety Programs*

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

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

ARTICLE 10 – ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

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

10.02 *Visits to Site*

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

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.08. Particularly, but without limitation, during

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or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Project Representative*

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

10.04 *Rejecting Defective Work*

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

10.05 *Shop Drawings, Change Orders and Payments*

A. Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, are set forth in Paragraph 7.16.

B. Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, are set forth in Paragraph 7.19.

C. Engineer's authority as to Change Orders is set forth in Article 11.

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

10.06 *Determinations for Unit Price Work*

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

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

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

10.08 *Limitations on Engineer's Authority and Responsibilities*

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

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

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

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

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

10.09 *Compliance with Safety Program*

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

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

11.01 *Amending and Supplementing Contract Documents*

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

1. *Change Orders*:

a. If an amendment or supplement to the Contract Documents includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order. A Change Order also may be used to establish amendments and supplements of the Contract Documents that do not affect the Contract Price or Contract Times.

b. Owner and Contractor may amend those terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, without the recommendation of the Engineer. Such an amendment shall be set forth in a Change Order.

2. *Work Change Directives*: A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.04 regarding change of Contract Price. Contractor must submit any Change Proposal seeking an

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adjustment of the Contract Price or the Contract Times, or both, no later than 30 days after the completion of the Work set out in the Work Change Directive. Owner must submit any Claim seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 60 days after issuance of the Work Change Directive.

3. *Field Orders*: Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.02 *Owner-Authorized Changes in the Work*

A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Such changes shall be supported by Engineer's recommendation, to the extent the change involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters. Such changes may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work shall be performed under the applicable conditions of the Contract Documents. Nothing in this paragraph shall obligate Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.03 *Unauthorized Changes in the Work*

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

11.04 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment of Contract Price shall comply with the provisions of Article 12.

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

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

2. where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.04.C.2); or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on

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the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.04.C).

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

1. a mutually acceptable fixed fee; or

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

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

b. for costs incurred under Paragraph 13.01.B.3, the Contractor's fee shall be five percent;

c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.01.C.2.a and 11.01.C.2.b is that the Contractor's fee shall be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.A.1 and 13.01.A.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of five percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted work the maximum total fee to be paid by Owner shall be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the work;

d. no fee shall be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;

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

f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 11.04.C.2.a through 11.04.C.2.e, inclusive.

11.05 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment in the Contract Times shall comply with the provisions of Article 12.

B. An adjustment of the Contract Times shall be subject to the limitations set forth in Paragraph 4.05, concerning delays in Contractor's progress.

11.06 *Change Proposals*

A. Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; appeal an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due; or seek other relief under

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the Contract. The Change Proposal shall specify any proposed change in Contract Times or Contract Price, or both, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents.

1. *Procedures*: Contractor shall submit each Change Proposal to Engineer promptly (but in no event later than 30 days) after the start of the event giving rise thereto, or after such initial decision. The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal. The supporting data shall be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event. Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal.

2. *Engineer's Action*: Engineer will review each Change Proposal and, within 30 days after receipt of the Contractor's supporting data, either deny the Change Proposal in whole, approve it in whole, or deny it in part and approve it in part. Such actions shall be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.

3. *Binding Decision*: Engineer's decision will be final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.

B. *Resolution of Certain Change Proposals*: If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice shall be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

11.07 *Execution of Change Orders*

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

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

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

3. changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.02, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters; and

4. changes in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under Paragraph 11.06, or Article 12.

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B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of this Paragraph 11.07, it shall be deemed to be of full force and effect, as if fully executed.

11.08 *Notification to Surety*

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

ARTICLE 12 – CLAIMS

12.01 *Claims*

A. *Claims Process*: The following disputes between Owner and Contractor shall be submitted to the Claims process set forth in this Article:

1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;

2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents; and

3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters.

B. *Submittal of Claim*: The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim shall rest with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, or both, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.

C. *Review and Resolution*: The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim shall be stated in writing and submitted to the other party, with a copy to Engineer.

D. *Mediation*:

1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate shall stay the Claim submittal and response process.

2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process shall resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim

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submittal and decision process shall resume as of the date of the conclusion of the mediation, as determined by the mediator.

3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.

E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action shall be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.

F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim shall be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.

G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim shall be incorporated in a Change Order to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

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

13.01 *Cost of the Work*

A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:

1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or

2. To determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.

B. *Costs Included*: Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 13.01.C, and shall include only the following items:

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, and vacation and holiday pay applicable

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

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

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.

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

5. Supplemental costs including the following:

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

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

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

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

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

    f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 6.05), provided such losses and damages have resulted from causes

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other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

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

h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.

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

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

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.

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

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

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

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. *Contractor's Fee*: When the Work as a whole is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 11.04.C.

E. *Documentation*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

13.02 *Allowances*

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

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B. *Cash Allowances*: Contractor agrees that:

1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. *Contingency Allowance*: Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

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

13.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.

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

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

E. Within 30 days of Engineer's written decision under the preceding paragraph, Contractor may submit a Change Proposal, or Owner may file a Claim, seeking an adjustment in the Contract Price if:

1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement;

2. there is no corresponding adjustment with respect to any other item of Work; and

3. Contractor believes that it is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price, and the parties are unable to agree as to the amount of any such increase or decrease.

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

14.01 *Access to Work*

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

14.02 *Tests, Inspections, and Approvals*

A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.

B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work shall be governed by the provisions of Paragraph 14.05.

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

D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:

1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;

2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;

3. by manufacturers of equipment furnished under the Contract Documents;

4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and

5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

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

E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.

F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering shall be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to

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cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

A. *Contractor's Obligation*: It is Contractor's obligation to assure that the Work is not defective.

B. *Engineer's Authority*: Engineer has the authority to determine whether Work is defective, and to reject defective Work.

C. *Notice of Defects*: Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.

D. *Correction, or Removal and Replacement*: Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.

E. *Preservation of Warranties*: When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

F. *Costs and Damages*: In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs, losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work shall be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

A. Engineer has the authority to require special inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.

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B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.

C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.

1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.

2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

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

14.07 *Owner May Correct Defective Work*

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

B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.

C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will

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include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

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

15.01 *Progress Payments*

A. *Basis for Progress Payments*: The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.

B. *Applications for Payments*:

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens, and evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

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

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

C. *Review of Applications*:

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

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

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a. the Work has progressed to the point indicated;

b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and

c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

   a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or

   b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

   a. to supervise, direct, or control the Work, or

   b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or

   c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or

   d. to make any examination to ascertain how or for what purposes Contractor has used the money paid on account of the Contract Price, or

   e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.

6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:

   a. the Work is defective, requiring correction or replacement;

   b. the Contract Price has been reduced by Change Orders;

   c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

   d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or

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e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due*:

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

E. *Reductions in Payment by Owner*:

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:

a. claims have been made against Owner on account of Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages on account of Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;

b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;

c. Contractor has failed to provide and maintain required bonds or insurance;

d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;

e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;

f. the Work is defective, requiring correction or replacement;

g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

h. the Contract Price has been reduced by Change Orders;

i. an event that would constitute a default by Contractor and therefore justify a termination for cause has occurred;

j. liquidated damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;

k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;

l. there are other items entitling Owner to a set off against the amount recommended.

2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount

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remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed shall be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 15.01.C.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than seven days after the time of payment by Owner.

15.03 *Substantial Completion*

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.

B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.

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

D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.

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E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.

F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. At any time Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through E for that part of the Work.

2. At any time Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

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

15.05 *Final Inspection*

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

15.06 *Final Payment*

A. *Application for Payment*:

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of

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inspection, annotated record documents (as provided in Paragraph 7.11), and other documents, Contractor may make application for final payment.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:

   a. all documentation called for in the Contract Documents;

   b. consent of the surety, if any, to final payment;

   c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.

   d. a list of all disputes that Contractor believes are unsettled; and

   e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

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

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

C. *Completion of Work*: The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment.

D. *Payment Becomes Due*: Thirty days after the presentation to Owner of the final Application for Payment and accompanying documentation, the amount recommended by Engineer (less any further sum Owner is entitled to set off against Engineer's recommendation,

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including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions above with respect to progress payments) will become due and shall be paid by Owner to Contractor.

15.07 *Waiver of Claims*

A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor. Owner expressly reserves claims and rights arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 15.05, from Contractor's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, from outstanding Claims by Owner, or from Contractor's continuing obligations under the Contract Documents.

B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted or appealed under the provisions of Article 17.

15.08 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents, or by any specific provision of the Contract Documents), any Work is found to be defective, or if the repair of any damages to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. correct the defective repairs to the Site or such other adjacent areas;
2. correct such defective Work;
3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting therefrom.

B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others).

C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.

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

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E. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16 – SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

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

16.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule);

2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;

3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or

4. Contractor's repeated disregard of the authority of Owner or Engineer.

B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) ten days written notice that Owner is considering a declaration that Contractor is in default and termination of the contract, Owner may proceed to:

1. declare Contractor to be in default, and give Contractor (and any surety) notice that the Contract is terminated; and

2. enforce the rights available to Owner under any applicable performance bond.

C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.

D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within seven days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.

E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses,

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and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.

G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond shall govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate For Convenience*

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

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

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

3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.

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

16.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for

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expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17 – FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

A. *Disputes Subject to Final Resolution*: The following disputed matters are subject to final resolution under the provisions of this Article:

1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full; and

2. Disputes between Owner and Contractor concerning the Work or obligations under the Contract Documents, and arising after final payment has been made.

B. *Final Resolution of Disputes*: For any dispute subject to resolution under this Article, Owner or Contractor may:

1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions; or

2. agree with the other party to submit the dispute to another dispute resolution process; or

3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18 – MISCELLANEOUS

18.01 *Giving Notice*

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person, by a commercial courier service or otherwise, to the individual or to a member of the firm or to an officer of the corporation for which it is intended; or

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

18.02 *Computation of Times*

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

18.03 *Cumulative Remedies*

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

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18.04 *Limitation of Damages*

A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

A. A party's non-enforcement of any provision shall not constitute a waiver of that provision, nor shall it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

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

18.07 *Controlling Law*

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

18.08 *Headings*

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

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SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract, EJCDC C-700 (2013 Edition) and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect. The General Conditions may also be supplemented elsewhere in the Contract Documents.

The terms used in these Supplementary Conditions which are defined in the Standard General Conditions of the Construction Contract, EJCDC C-700 (2013 Edition) have the meanings assigned to them in the General Conditions.

PART 1 - MODIFICATIONS AND SUPPLEMENTS TO GENERAL CONDITIONS

SC-2.01 Delivery of Bonds and Evidence of Insurance

Delete paragraph 2.01 C. of the General Conditions in its entirety and insert the following in its place:

C. This subsection is not needed.

SC-3.03 Reporting and Resolving Discrepancies

Delete the paragraph 3.03 A.3 in its entirety and insert the following in its place:

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 or unless Contractor reasonably should have known of such conflict, error, ambiguity or discrepancy.

SC-4.01 Commencement of Contract Time; Notice to Proceed

Delete the last sentence of paragraph 4.01 A. of the General Conditions and insert the following in its place:

In no event will the Contract Time commence to run later than the __120th__ day after the day of the Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier, unless agreed otherwise by Owner and Contractor in writing.

SC-5.03 Subsurface and Physical Conditions

Delete paragraphs 5.03 A. and 5.03 B. in of the General Conditions in their entirety and insert the following in their place:

5.03 Subsurface and Physical Conditions

A. Reports and Drawings: Division 1: General Requirements of the Specifications shall identify those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the site and drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the site that have been utilized by Engineer in preparation of the Contract Documents. Contractor may rely upon the accuracy of any Technical Data contained in such reports that is specifically referenced in Division 1: General Requirements as Technical Data that can be relied on by Contractor. Except as indicated above, Contractor shall have full responsibility with respect to subsurface and physical conditions at the site.

B. Contractor may rely on the technical data as set forth in subsection A above, but such reports and drawings are not Contract Documents. Except for such reliance on Technical Data, Contractor may

not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

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

SC-5.06 Hazardous Environmental Conditions at Site

Delete paragraphs 5.06 A., 5.06 B. and 5.06 I. in of the General Conditions in their entirety and insert the following in their place:

A. No reports or drawings related to Hazardous Environmental Conditions at the Site are known to Owner.
B. This subsection is not needed.
I. This subsection is not needed.

SC-6.01 Performance, Payment and Other Bonds

Add the following language at the end of Paragraph 6.01 A.:

In accordance with section 255.05(1), Fla. Stat., as amended from time to time, before commencing the Work or before recommencing the Work after a default or abandonment, the Contractor shall execute and record in the public records of Palm Beach County a payment and performance bond with a surety insurer authorized to do business in the State of Florida, and the Contractor shall be required to provide to the Owner a certified copy of the recorded bond. The Owner may not make a payment to the Contractor until the Contractor has complied with section 255.05(1)(b), Fla. Stat.

SC-6.02 Insurance – General Provisions

Add the following language at the end of Paragraph 6.02 C.:

Contractor shall deliver the required certificates of insurance prior to the commencement of any Work at the site. All of the policies of insurance (or the certificates or other evidence thereof) required to be purchased and maintained by Contractor shall be "claims made" and contain the name of the Project.

SC-6.03 Contractor's Insurance

Delete the following language in Paragraph 6.03 G.:

G. *Additional insureds*: The Contractor's commercial general liability, ~~automobile liability,~~ umbrella or excess, and pollution liability policies shall include and list as additional insureds Owner and Engineer, and any individuals or entities identified in the Supplementary Conditions; include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds; and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby (including as applicable those arising from both ongoing and completed operations) on a non-contributory basis. Contractor shall obtain all necessary endorsements to support these requirements.

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

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

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

State:	Statutory
Applicable Federal (e.g. Longshoreman's and Harbor Workers' Compensation, Maritime, Jones Act, etc.):	Statutory

Employer's liability:

Bodily injury, each accident	$1,000,000
Bodily injury by disease, each employee	$1,000,000
Bodily injury/disease aggregate	$1,000,000

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

General Aggregate	$3,000,000
Products and Completed Operations Aggregate	$3,000,000
Personal and Advertising Injury	$1,000,000
Each Occurrence (Bodily Injury and Property Damage)	$1,000,000

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

Combined Single Limit of	$1,000,000

4. Excess or Umbrella Liability under paragraph 6.03 E. of the General Conditions:

Per Occurrence	$If applicable
General Aggregate	$If applicable

SC-6.04 Owner's Liability Insurance

Delete paragraphs 6.04 A. and 6.04 B. of the General Conditions in their entirety and insert the following in their place:

A. This Subsection is not needed.
B. This subsection is not needed.

SC-6.05 Property Insurance

Add the following language at the end of paragraph 6.05 C.:

The maximum deductible amount for any insurance required under paragraph 6.05 shall be $5,000.00.

SC-6.06 Waiver of Rights

Delete paragraphs 6.06 B. and 6.06 C. of the General Conditions in their entirety and insert the following in their place:

B. This Subsection is not needed.
C. This subsection is not needed.

SC-7.01 Supervision and Superintendence

Add the following language at the end of paragraph 7.01 B.:

The superintendent will be Contractor's representative at the site and shall have authority to act on behalf of Contractor. All communications given to the superintendent shall be as binding as if given to Contractor.

SC-7.07 Patent Fees and Royalties

Delete paragraph 7.07 B. and insert the following in its place:

B. This subsection is not needed.

SC-7.08 Permits

Add the following language at the end of paragraph 7.08 A.:

Contractor shall obtain and pay for the following permits:

1. City of Lake Worth Building Permit. Include in the bid amount a 3-percent of appropriate items permit fee based on the bid cost. This permit fee amount will be adjusted based on the actual fee charged and the difference credited, as applicable.
2. Any other applicable permits.

SC-7.18 Indemnification

Delete paragraph 7.18 A. and insert the following in its place:

A. Contractor shall indemnify and hold harmless Owner and Engineer and their respective officers and employees from liabilities, damages, losses, and costs, including, but not limited to, reasonable attorney's fees, to the extent caused by the negligence, recklessness, or intentional wrongful misconduct of the Contractor and persons employed or utilized by the Contractor in the performance of the Contract Documents. Compliance with any insurance requirements required elsewhere in the Contract Documents shall not relieve Contractor of its liability and obligation to hold harmless and indemnify the City as set forth in this section. It is the specific intent of the parties hereto that the foregoing indemnification complies with section 725.06, Florida Statutes. It is further the specific intent and agreement of the parties that all of the Contract Documents on this Project are hereby amended to include the foregoing indemnification and the required "Specific Consideration" therefore. Nothing contained in the Contract Documents shall be construed or interpreted as consent by the City to be sued, nor shall the Contract Documents be construed as a waiver of sovereign immunity beyond the waiver provided in section 768.28, Fla. Stat., as amended from time to time.

SC-10.03 Project Representative

Add the following new paragraph immediately after paragraph 10.03 A.:

B. On this Project, by agreement with the Owner, Engineer will not furnish a Resident Project Representative to represent Engineer at the Site or assist Engineer in observing the progress and quality of the Work. However, if the Engineer does furnish a Resident Project Representative per

paragraph 10.03 of the General Conditions, the duties, etc. of the representative shall be as provided in the Listing of the Duties, Responsibilities and Limitations of Authority of the Resident Project Representative as included in the Project Manual. 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 shall be presented at the Preconstruction Conference or as otherwise set forth in the Project Manual.

SC-10.04 Rejecting Defective Work

Add the following language at the end of paragraph 10.04 A.:

A. Engineer also has the authority to disapprove or reject Work which 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.

SC-11.04 Change of Contract Price

Delete paragraphs 11.04 C.2.c. and 11.04 C.2.e. in their entirety and insert the following in their place:

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 maximum allowable to Contractor on account of overhead and profit of all Subcontractors shall be fifteen percent;

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 ten percent of such net decrease; and

SC-13.03 Unit Price Work

Delete paragraph 13.03 E. in its entirety and insert the following in its place:

E. Contractor may not make a claim for additional expenses incurred as a result of a difference between final quantity of any item(s) of Unit Price Work and the estimated quantity of such item(s) in the Contract Documents, unless specifically allowed in the Bid Form. Any adjustments specifically allowed shall be made in accordance with directions in the Bid Form.

SC-16.03 Owner May Terminate for Convenience

Add the following new paragraph immediately after paragraph 16.03 B.:

C. If a court of competent jurisdiction finds that the Owner wrongfully terminated this Contract, then in such event, this Contract shall be deemed terminated for convenience as provided for in this paragraph, and the Contractor shall not be entitled to loss of anticipated overhead, profits, or revenue, or other economic loss arising out of or resulting from such termination but may be entitled to all items as authorized herein.

SC-18.07 Controlling Law

Delete paragraph 18.07 A. in its entirety and insert the following in its place:

A. This Contract is to be governed by the laws of the State of Florida. The venue for any and all legal action necessary to enforce the Contract Documents will be in Palm Beach County, Florida.

PART 2 - ADDITIONAL SUPPLEMENTARY CONDITIONS

1. ATTACHMENTS:

The following forms included in the Project Manual shall be used by Contractor for submittals required by the Contract Documents (unless Owner accepts other form):

a. Construction Performance Bond (00610).

b. Construction Payment Bond (00620).

c. Notice of Compliance with Chapter 556, Florida Statutes (00630).

d. Contractor's Affidavit to Owner (00670).

e. Form of Application for Payment (00680).

END OF SECTION

00820
SPECIAL CONDITIONS

CITY OF LAKE WORTH PURCHASING DEPARTMENT REQUIREMENTS

SPC-1 APPROVAL OF ACCOUNTING SYSTEM

Except with respect to firm fixed-price contracts, no contract type shall be used unless the Purchasing Manager has determined in writing that:

1) The proposed contractor's accounting system will permit timely development of all necessary cost data in the form required by the specific contract type contemplated; and

2) The proposed contractor's accounting system is adequate to allocate costs in accordance with generally accepted cost accounting principles.

SPC-2 RIGHT TO INSPECT PLANT

The City may, at reasonable times, inspect any part of the plant, place of business, or work site of a contractor or subcontractor which is pertinent to the performance of any contact awarded or to be awarded by the City.

SPC-3 RIGHT TO AUDIT RECORDS

1) Audit of Cost or Pricing Data: The City may, at reasonable times and places audit the books, documents, papers and records of any contractor who has submitted cost or pricing data to the extent that such books, documents, papers and records are pertinent to such cost or pricing data. Any person who receives a contract, change order or contract modifications for which cost or pricing data is required, shall maintain such books, documents, papers and records that pertinent to such costs or pricing data for five (5) years from the data of the final payment under the contract.

2) Contract Audit: The City shall be entitled to audit the books, documents, papers and records of a contractor or a subcontractor at any tier under any negotiated contract or subcontract other than a firm fixed-price contract to the extent that such books, documents, papers and records are pertinent to the performance of such contract or subcontract. Such books, documents, papers and records shall be maintained by the contractor for a period of five (5) years from the date of final payment under the prime contract and by the subcontractor for a period of five (5) years from the date of final payment under the subcontract.

3) Contractor Records: If a contract is being funded in whole or in part by assistance from a federal agency, then the contract shall include provisions:

   A) Requiring the contractor and subcontractor at any tier to maintain for five (5) years from the date of final payment under the contract all books, documents, papers and records pertinent to the contract; and

B) Requiring the contractor and subcontractor at any tier to provide to the City, the federal grantor agency, the Comptroller General of the United States, or any of their duly authorized representatives access to such books, documents, papers and records for the purposes of examining. Auditing and copying them.

SPC-4 LOCAL VENDOR PREFERENCE

A local vendor preference shall be used in accordance with section 2-117(b) of the City of Lake Worth Code of Ordinances. In the event the lowest responsive, responsible bidder or the highest ranked responsive, responsible proposer in the procurement of goods, services or construction is a non-LOCAL business, then all bids and or proposals from responsive, responsible LOCAL businesses to the same solicitation shall be adjusted by five (5) percent, solely for the purpose of determining bid/contract award. The bid price of LOCAL bidders will be adjusted downward by five (5) percent for purposes of ranking of bidders.

In no event, shall the application of this adjustment to a responsive quote or bid change the actual bid amount. Further, it will not cause the City to pay more than $15,000 above the amount bid by that non-local vendor, which would have been recommended for award if the local vendor preference had not been applied.

If the application of the five-percent local vendor preference causes the *evaluated local vendor price* to be less than the actual low-bid price, but the actual bid price of the local vendor is more than $15,000 higher than the actual low-bid price of a non-local vendor, then the non-local vendor submitting the actual low-bid, shall be viewed as the low-bidder, and be recommended for award, unless for reasons other than price, the bid is not found to be responsive and/or responsible.

The determination as to whether a bidder or proposer is a local or non-local business shall be made by the Purchasing Division, after confirming the vendor has a valid business tax receipt and certificate of occupancy, as reflected within the Business Master File of the city's ERP system. The bidder or proposer does not have to be a current vendor to the City (City as a customer) at the time of bidding/proposing, but must have been issued a business tax receipt applicable to the goods/services/ construction being requested, PRIOR to the due date/time for bids/proposals. Prior to making an award through the application of the local vendor preference, city staff may require a bidder or proposer to provide additional information at any time prior to the award.

A *LOCAL business*, for the purposes of the application of a local vendor preference, means a bidder or proposer which has a permanent, physical place of business within the city limits, and a valid business tax receipt applicable to the required goods, services, or construction items being procured. Post office boxes or locations at a postal service center are not verifiable and shall not be used for the purpose of establishing said physical address. If the business is a joint venture/partnership, it is sufficient for qualification as a LOCAL business if at least one party of the joint venture/partnership meets the test set forth in this Section.

Non-LOCAL business means a bidder or proposer which is not a LOCAL business as defined herein.

Permanent place of business means headquarters which are located within the city limits or a permanent office or other site located within the city limits from which a bidder or proposer will produce a substantial portion of the goods or perform a substantial portion of the services to be purchased. A post office box or location at a postal service center shall not constitute a permanent place of business.

SPC-5 CONTRACTOR'S START OF WORK & CHANGE OF SCOPE

1) The Contractor shall not perform work without a Purchase Order.

2) The Contractor shall not work out of scope without a signed, issued work directive change or change order to the purchase order, authorizing the additional work and any change to the period of performance (Construction Contract Time).

SPC-6 APPROPRIATION OF FUNDS

This project is subject to approval and appropriation of funds by the City of Lake Worth Commission.

SPC-7 BUILDING PERMIT FEE

A building permit fee equal to 3-percent of the appropriate items of accepted bid shall be included in the project costs. See Supplemental Conditions paragraph SC-7.08 for further details.

SPC-8 CONE OF SILENCE

Communications shall be in accordance with the City of Lake Worth Municipal Code, Article XIV Purchasing, Section 2-112(k) Cone of Silence.

DIVISION 1

GENERAL REQUIREMENTS

SECTION 01010
SUMMARY OF WORK

PART 1 - GENERAL

1.01 GENERAL

A. The Work to be performed under this Contract shall consist of furnishing all equipment, materials, supplies, and manufactured articles; furnishing all transportation and services, including fuel, power, water, and essential communications; and performing of all labor, work, installation, testing 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 shown 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 performed, furnished, and installed by the Contractor as though originally so specified or shown, at no increase in cost to the Owner.

B. The explanation of the Work in this Section is made for explanation and guidance purposes. The omission of reference to any required work by the Contractor to comply with Federal, State, or local regulatory agencies shall not alter the intent of the Bid Form, nor shall it relieve the Contractor of the necessity of furnishing such work as part of the Contract.

C. Wherever the Contract Documents address a third party, i.e., subcontractor, manufacturer, etc., it is to be considered as the Contractor through the third party.

D. Wherever a reference to number of days is noted, it shall be construed to mean calendar days.

E. Quality Control

1. Contractor shall develop and maintain a program, acceptable to Owner and Engineer, to ensure that all work required under this Contract strictly conforms to all requirements of the Contract Documents. Contractor shall be responsible for and supervise the work of all subcontractors, providing instructions to each when their work does not conform to the requirements of the Quality Control Program and the Contract Documents.

2. The Contractor shall perform all work in accordance with current approved Federal, State, and Local Laws, Regulations, Codes, Ordinances, Orders, and other legal requirements of Public Authorities which bear on the performance and safety of the work.

3. All of the Contractor's work place procedures and conditions shall meet applicable OSHA standards.

1.02 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work set forth within these Bid Documents includes the furnishing of all labor, materials equipment, services and incidentals for the construction of, but not limited to:

Volume No. 1 - Lime System Upgrades and Improvements

- Demolition and replacement of the existing lime bin dust scrubber unit with a dry-type dust collector unit.

- Modification of the existing volumetric lime feeder units (Total of 3) to provide increased lime feed rate turndown capabilities. Increased turndown shall be achieved by replacing the existing drive motor and by integrating a new direct current, variable speed drive at each of the existing feeder units. The proposed improvements shall allow the City to flow pace the addition of lime.

- Demolition and replacement of the existing gravity type coagulant feed unit with a duplex, solenoid driven diaphragm metering pump skid including all interconnecting and conveyance piping.

- Demolition and replacement of the existing lime bin vibratory shaker units.

- Construction of a steel bulkhead wall to completely isolate Lime Storage Bin No's 3 and 4. Upon construction of the bulkhead wall each lime storage bin shall be capable of storing lime at varying levels.

- Specific structural improvements including the modification of the existing lime bin access hatches and installation of permanent aluminum, bin access stairs.

- Specific instrumentation and control (I&C) system upgrades required to facilitate remote monitoring, fault indication and reset/restart of the existing lime slaker units (Total of 3) through the existing plant SCADA system.

Volume No. 2 - Lime Basin Safety Improvements

- The Work includes specific safety improvements within the limits of the lime basin structure at the City of Lake Worth Water Treatment Plant including:

    - Removal, cleaning and reinstallation of walkway grating sections using hold down clips.

- Surface preparation and recoating of specific structural support members as shown on the Drawings.

- Demolition and disposal of existing ship ladders as well as the supply and installation of railing system closure components.

- Upgrade of specific sections of railing systems to three (3) rail type hand/guard rail systems.

- Installation of self-closing type swing gates at specific locations shown on the Drawings.

Volume No. 3 - Plant Safety Improvements

- The Work includes specific safety improvements within the limits of the City of Lake Worth WTP, excluding the lime basin structure, as generally described below:

    - Installation of an adjustable safety netting system around each of the R.O. process skid units.

    - Replacement of the existing stairways and railings at the access point to the lime dust collector roof.

    - Installation of new trench covers adjacent to the existing degasifier units.

    - Installation of new overpipe access ladders and platforms within the Pipe Gallery-Pump Room.

    - Replacement of the existing hand/guardrail system located on the Mezzanine Level of the Pipe Gallery-Pump Room as well as an existing ship ladder. Work will also include the installation of a new self-closing type swing gate.

    - Installation of a new hand/guardrail system around the northeast corner of the clearwell structure.

    - Installation of new coiling rollup shutter systems along the second floor pedestrian bridge which connects the R.O. Water Treatment Plant building to the Filter Control/Pipe Gallery building.

B. The Work is located at the City of Lake Worth Water Treatment Plant located at 301 College Street, Lake Worth, Florida 33460.

C. The Contractor and all Subcontractors selected for this project must have the appropriate Local Business Licenses and be certified with the State of Florida Department of Professional Regulation.

D. All accessories and appurtenances shall be new, recent manufacture, complete and ready to use.

E. The Contractor shall bear sole responsibility for issuing all required notices.

1.03 CONTRACT METHOD

A. The Work, hereunder will be constructed under a single lump sum contract.

1.04 WORK BY OTHERS

A. The Contractor is hereby notified that other Contractors will be working in the vicinity of the project area. The Contractor will be required to coordinate the completion of the Work with the work being performed by others.

1.05 SEQUENCE OF CONSTRUCTION

A. The Owner and Engineer must be notified seventy-two (72) hours prior to the commencement of work at the project site.

B. Work under the Contract shall be scheduled and performed in such a manner as to result in the least possible disruption to the operation of the existing utility facilities and the least possible disruption to neighboring residents and traffic. The operation of existing equipment and valves/appurtenances when necessary shall be undertaken by the Owner.

C. Critical events in the sequence of construction are specified herein. The outlined sequence of construction does not include all items necessary to complete the work, but is intended to identify the sequence of critical events necessary to minimize disruption in the daily operations at the City of Lake Worth WTP. 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. The outlined sequence is intended only to indicate which activities must precede other activities in order to minimize interference and disruptions. The sequence of construction is as follows:

1. Phase 1 - Mobilization and Preliminary Work

   a. Mobilization for work - obtain permits, develop and submit construction schedule, shop drawing schedule, schedule of values, and begin shop drawing submittals.

2. Phase 2- Replacement of Dust Collector Unit

   a. Prior to demolition and replacement of the existing wet-type dust scrubber unit the Contractor shall coordinate with the City's operation staff to ascertain the timing for any scheduled lime deliveries. Contractor shall schedule the Work upon confirmation with the Owner that an adequate inventory of quicklime is available to support the lime softening process operations for the duration of the dust collector unit replacement activities.

   b. Upon installation of the new dust collector unit the Contractor shall coordinate with the Owner to schedule a lime delivery offload to facilitate testing the performance of the installed unit to confirm conformance with the stipulated performance requirements of the specifications.

   c. Contractor shall commence with the facility safety improvements shown in Project Plan Volume's No. 2 and 3 at any point after mobilizing to the project site.

3. Phase 3 – Replacement of Coagulant Feed System

   a. Prior to demolition and replacement of the existing gravity-type coagulant feed system Contractor will be required to coordinate with the Owner to secure an adequate volume of dispersed polymer solution for the duration of the Work. Contractor will be required to provide a temporary storage and feed system which is adequately sized to ensure delivery of the solution to the flash mixer for the duration of the replacement work. The current average and maximum usage of dispersed polymer at the facility is 0.66 gallon per hour (gph) and 1.15 gph, respectively. Upon set-up and placing the temporary feed system into service the Contractor shall coordinate with the Owner to ensure that the existing coagulant mixing station tank is empty in order to facilitate replacement of the feed piping between the tank and the feed system.

   b. Prior to removing the temporary coagulant storage and feed system from service, the Contractor shall demonstrate, at a minimum, that the new coagulant feed system is capable of being operated locally and that the Owner has prepared an additional and adequate volume of dispersed coagulant at the existing mixing station. Remote operation of the new coagulant feed system via the plant SCADA system shall be capable within seven (7) days of initial startup and operation of the feed system locally.

4. Phase 4 – Modification of the Volumetric Lime Feeder Units

   a. The Contractor shall modify and upgrade the three (3) existing volumetric lime feeder units which are dedicated to each of the existing lime slaker units to provide additional feed rate turndown capabilities. Prior to initiating any work, the Contractor shall coordinate the work sequence with the Owner based on the current operating status of the slaker units. The Contractor will not be permitted to remove more than one volumetric feeder/slaker unit at a time. All required work at each feeder shall be completed, tested and ready for service prior to proceeding with the modifications required on a subsequent unit.

5. Phase 5 – Replacement of the Lime Bin Vibratory Units.

   a. Prior to the removal of the existing lime bin vibratory units and in advance of the use of torches and/or welding units along the exterior of the lime storage bin hoppers, each of the lime storage bins shall be systematically emptied of all quicklime material. The Contractor shall schedule the work and advise the Owner of the impending date which the work which he anticipates completing the work at least four (4) weeks in advance. Contractor will be required to sequence the work such that at least two (2) lime storage bins are available for use at all times.

6. Phase 6 – Lime Bin Structural Modifications

   a. Prior to completion of the miscellaneous structural modifications to the lime bin units the Contractor will be required to coordinate the sequence of the work with the Owner so at not interfere with the day to day lime softening operations. The Work will include the following:

      1) Construction of a steel bulkhead wall between Lime Storage Bin No's. 3 and 4.

      2) Modification of the existing 24-inch x 24-inch observation hatches on Lime Bin No's. 1, 3 and 4. The maximum clear openings(s) of the hatches shall be 12-inch x 12-inch.

      3) Demolition and replacement of the existing timber access stairs to Lime Bin No's 1, 3 and 4. Replacement stairs shall be metal and permanently affixed.

7. Phase 7 - Final Completion and Project Closeout

   a. Complete miscellaneous punchlist items and cleanup work.

b. Complete project closeout in accordance with Section 01700, "Project Closeout".

c. Final acceptance of project

D. The Contractor shall be aware that the elevations and locations of the existing utilities and structures have been prepared from the most reliable information available to the Engineer, however, it shall be this Contractor's responsibility to determine the location, character and depth of any existing utilities. Where required to complete the Work, the Contractor shall excavate and uncover all existing utilities to determine the exact elevations, location, type and size of all existing utilities sufficiently in advance of his work, prior to submittal of applicable shop drawings, to ensure that all required materials are available when crossing or connecting to the existing utilities for force mains is to occur. Any damage to existing utilities as a result of the Contractor's construction activities shall be repaired at no cost to the Owner.

E. The existing facilities shall be maintained in an operable condition by the Contractor during construction (excluded from this requirement are all normal and emergency maintenance functions normally performed by the Owner with the Owner's staff or by Contract.) All work by the Contractor that, as necessary, disrupts the normal operations shall be shown on the Construction Schedule and specifically scheduled with the Owner. Schedule notification shall consist of a written notice defining the work to be accomplished, the normal function that will be interrupted, the duration of the interruption, and the mitigating effort to be performed by the Contractor to maintain operation. Written notice shall be submitted to the Engineer fourteen (14) days in advance of the proposed work and the Engineer will respond to the Contractor in writing within 7 days of receipt of the notice regarding the acceptability of the proposed plan.

F. At no time shall the Contractor undertake to close off any pipelines, open valves, or take any other action which would affect the operation of any existing utilities.

G. Temporary installation/connections, pumping and/or storage systems may be used where sufficient time is not available to complete a particular aspect of the work without interrupting utility operations. All such subject temporary installations shall be subject to review and acceptance by the Engineer.

1.06 ABANDONMENT AND SALVAGE OF EXISTING FACILITIES

A. The scope of work requires the Contractor to interface with existing structures, mechanical equipment, electrical facilities and piping which will be abandoned or otherwise removed and/or relocated as part of the work. Prior to beginning any work, associated with existing facilities to be abandoned, salvaged, or otherwise removed or relocated, the Contractor shall inform the Engineer of his intent so that all arrangements can be made with the Owner for 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 Engineer.

B. Pipelines

1. The Contractor shall abandon, salvage or otherwise remove existing pipelines or segments of existing pipelines shown to be abandoned in place, salvaged, or removed as part of the contract work. Unless otherwise indicated in the Contract Documents, all piping shown on the Drawings to be abandoned shall be abandoned in place. Pipe shown to be abandoned need only be removed a minimum three feet clear of new utilities to be installed. Abandon-in-place shall be defined as installing plugs, or other permanent closure, as reviewed and accepted by the Engineer, on all terminations, open ends or ends of pipe designated as being cut, capped and anchored in an acceptable manner. The pipe will remain buried unless otherwise noted.

C. Below grade piping which is indicated on the Drawings as being removed, or any piping to be abandoned which interferes with new structures or piping, shall be excavated and removed using methods which will not disturb adjacent piping or other facilities. All pipe materials shall be subject to salvage by the Owner as defined below. Any remaining piping on both ends of pipe segments removed shall be abandoned in-place, per the above definition. After piping has been removed, the Contractor shall backfill the evacuated area in accordance with requirements set forth in other sections of these specifications.

D. Salvage

1. The Owner may desire to salvage certain items of existing equipment which are to be dismantled and removed during the course of construction. Prior to removal of any existing equipment or piping from the site of work, the Contractor shall ascertain from the Engineer whether or not the particular item or items are to be salvaged. Items to be salvaged shall be stockpiled on the site, or delivered to a storage area at a location within a three-mile radius of the site as directed by the Engineer. All other items of equipment shall be disposed of off-site by the Contractor at his expense, in accordance with applicable laws, ordinances and regulations.

1.07 CONTRACTOR'S USE OF PROJECT SITE

A. The Contractor's use of the project site shall be limited to its construction operations, including on-site storage of materials, on-site fabrication facilities, and field offices, as noted on the Contract Drawings.

1.08 OWNER'S USE OF THE PROJECT SITE

A. The Owner will use all of the existing facilities during the entire period of construction for the conducting of the Owner's normal operations. The Contractor shall cooperate and coordinate with the Owner to minimize interference with the Contractor's operations and to facilitate the Owner's operations.

1.09 PARTIAL UTILIZATION OF THE WORK BY OWNER

A. The Owner may accept the responsibility for the maintenance and protection of a specific portion of the project if utilized prior to completion. However, the Contractor shall retain full responsibility for satisfactory operation of the total project.

1.10 PROJECT MEETINGS

A. Preconstruction Conference

1. Prior to the commencement of Work at the site, a preconstruction conference will be held at a mutually agreed time and place which shall be attended by the Contractor, its superintendent, and its subcontractors as appropriate. Other attendees will be:

    a. Engineer

    b. Representatives of Owner

    c. Governmental representatives as appropriate

    d. Others as requested by Contractor, Owner or Engineer

2. Unless previously submitted to the Engineer, the Contractor shall bring to the conference and present the following:

    a. Preliminary schedule

    b. Preliminary Shop Drawing/Sample/Substitute or "Or Equal" submittal schedule

3. The purpose of the conference is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established. The agenda will include:

    a. Contractor's tentative schedules

    b. Transmittal, review, and distribution of Contractor's submittals

    c. Processing applications for payment

    d. Maintaining record documents

    e. Critical work sequencing

f. Field decisions and Change Orders

g. Use of project site, office and storage areas, security, housekeeping, the Owner's needs

h. Major equipment deliveries and priorities

4. The Engineer will preside at the preconstruction conference and will arrange for keeping the minutes and distributing the minutes to all persons in attendance.

B. Preliminary CPM Schedule Review Meeting

The Contractor shall within twenty (20) days of the Pre-construction Conference, meet with the Owner and Engineer to review the Preliminary CPM Schedule submittal. The Contractor shall have his Project Manager, Project Superintendent, and the Project Scheduler in attendance, as well as major subcontractors and suppliers as he shall deem appropriate. This review will provide an opportunity to incorporate Owner and Engineer activities and relationships that may affect the critical path, as well as to ensure that all material activities have been included.

C. Progress Meetings

1. The Engineer will schedule and hold regular on-site progress meetings at least once monthly and at other times as requested by Engineer. The Owner, Contractor, Engineer, and all subcontractors active on the site shall be represented at each meeting. Contractor may at its discretion request attendance by representatives of its suppliers, manufacturers, and other subcontractors.

2. The Engineer will preside at the meetings and provide for keeping and distribution of the minutes. The purpose of the meetings will be to review the progress of the Work, maintain coordination of efforts, discuss changes in scheduling, and resolve other problems which may develop.

1.11 PROGRESS OF WORK

A. If at any time, the material and appliances to be used appear to the Engineer as insufficient or improper for securing the quality of work required, or the required rate or progress, he may order the Contractor to increase his efficiency or to improve the character of his work and the Contractor shall conform to such an order; but the failure of the Engineer to demand any increase of such efficiency or any improvement shall not release the Contractor from his obligation to secure the quality of work or the rate of progress necessary to complete the work within the limits imposed by the Contract.

1.12 PERMITS

A. It shall be the Contractor's responsibility to make application and to obtain/secure all permits and licenses of every description required to initiate and complete the work under this contract, except for those permits obtained by the Owner.

B. Permit applications submitted by and permit fees paid by the Owner or his authorized representative include the following:

1. Palm Beach County Health Department Specific Permit to Construct Potable Water System (PWS) Components

C. The Contractor shall pay for all other permit fees required to complete all work as part of this Contract and shall include the costs for all other permits in the applicable item of the Proposal. **The Owner shall directly pay all fees associated with the City of Lake Worth Building Permit and Sub-fee'd Building Permits, where applicable.**

D. The Contractor shall furnish to the Engineer copies of all permits prior to commencement of work requiring permits.

1.13 FIELD ENGINEERING

A. The Contractor shall employ a Land Surveyor registered in the State of Florida and acceptable to the Engineer. The Contractor shall locate and protect survey control and reference points.

B. The Contractor shall provide Field Engineering Services and shall establish elevations, lines, and levels, utilizing recognized engineering survey practices.

C. The Contractor shall submit a copy of registered site drawing and certificate signed by the Land Surveyor certifying that the elevations and locations of the Work are in conformance with the Contract Documents.

D. If dimensions of equipment or piping locations are not shown on the Drawings, coordinate this requirement with the Resident Engineer.

1.14 DIMENSIONS OF EXISTING STRUCTURES

A. Where the dimensions and locations of existing structures and piping are of critical importance in the installation or connection of new work, the Contractor shall verify such dimensions and locations in the field before the fabrication of any materials or equipment which is dependent on the correctness of such information.

1.15 DOCUMENT SECURITY AND LABLEING

A. Contractor shall abide by the following regulations:

1. FS Chapter 281.301- Security systems; records and meetings exempt from public access or disclosure.

2. FS Chapter 119.07 - Inspection, examination, and duplication of records; exemptions.

B. Documents generated and/or used for this project that fall within the listed regulations above Must Be Labeled With The Following Verbiage:

City of Lake Worth Water Utilities Department Document

CONFIDENTIAL

Sensitive Security Information

NOT FOR PUBLIC DISCLOSURE

In Accordance with:
FS, Chapter 281.301
FS, Chapter 119.07

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01020
ALLOWANCES

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. Include in the Total Base Bid Price all allowances stated in the Contract Documents.

B. Include in the Schedule of Payment Values the amount of each Allowance specified herein.

1.02 CONTRACT ALLOWANCES

A. Included in this Contract are the following allowances:

Item	Not to Exceed Lump Sum Amount
Miscellaneous Allowance Items	$ 20,000.00
TOTAL	**$ 20,000.00**

B. Reimbursement.

1. The Contractor is not entitled to the entire allowance amounts as part of the Contract. Reimbursement will be made up to the maximum amount identified for each allowance. If actual reimbursements total less than the amount in 1.02.A, the difference shall be deducted from the Total Base Bid Price by Change Order.

2. Determination of reimbursement amount: The value of any Work authorized by the Owner for an increase or decrease in the Allowance shall be determined by the following method:

   a. On the basis of the cost of the Work (determined based on final invoice), with a maximum of five (5) percent Contractor markup for overhead and profit on labor and material items and for sub-contractors. There shall be no markup for fee-type charges (e.g. utility Permanent Power charges, permit fees, etc.).

   b. Payment of the allowance items shall be based on proper documentation from the Contractor (e.g. receipts for materials, labor itemization, machinery documentation, etc.) as deemed required by the Engineer.

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 furnishing 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, so that its proposal for the project does reflect its total price for completing the work in its entirety.

C. Schedule of value descriptions are to match the activity descriptions on the CPM schedule.

1.02 PAYMENT ITEMS

A. The Contractor shall submit a Schedule of Payment Values for review with the return of the executed Agreement to the Owner. The schedule shall contain the installed value of the component parts of work for the purpose of making progress payments during the construction period.

B. The schedule shall be given in sufficient detail for the 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 anticipates the need for payment for materials stored on the project site or off-site in a bonded warehouse, he shall also submit a separate list covering the cost of materials, delivered and unloaded with taxes paid. This list shall also include the installed value of the item with coded reference to the work items in the Schedule of Payment Values. Similar procedures shall be employed for undelivered specifically manufactured equipment and materials as specified herein.

D. The Contractor shall expand or modify the schedule and associated listing of all work items as required by the Engineer's initial or subsequent reviews to accurately identify, in sufficient detail, the amount and value of the work accomplished.

E. The Contractor shall make the schedule of values as accurate as possible as the approved values may be used to develop change order pricing, at the Engineers discretion.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01060
REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provision of Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to work in this section.

1.02 CODE REQUIREMENTS

A. All work on this Project shall be done in strict accordance with, but not limited to, applicable requirements and portions of the latest editions of the currently adopted codes, revisions, amendments, and their references, in the Jurisdiction having authority.

1. Florida Building Code 2014 (or latest version), including all local jurisdiction amendments, which includes:

   a. Florida Building Code - Building

   b. Florida Building Code - Fuel Gas

   c. Florida Building Code - Mechanical d. Florida Building Code - Plumbing

   d. Florida Accessibility Code for Building Construction - FBC Chapter 11

   e. National Electrical Code - FBC Chapter 27

   f. FBC Referenced Codes and Standards -- Chapter 35

2. Florida Fire Prevention Code, Ch. 4A-60, Florida Administrative Code, which includes:

   a. NFPA 1 - 2000

   b. NFPA 101-2000

   c. Referenced Mandatory Codes and Standards listed in 4A-60.005, FAC

   d. Referenced Mandatory Codes and Standards listed in NFPA 101-00: Chapter 2

   e. National Electrical Code (N.E.C.) -- NFPA 70)

3. U.S. Access Board, Americans with Disabilities Act Architectural Guidelines, 1998 (ADAAG) for accessibility requirements for children.

4. American Society of Civil Engineers. Minimum Design Loads for Buildings and Other Structures - ASCE 7-98

1.03 CODE STANDARDS

A. All work shall conform to applicable portions of the adopted, or if not adopted, the latest edition of the standards listed which shall include, but is not limited to, the following:

1. Aluminum Association (A.A.)

2. American Concrete Institute (A.C.I.)

3. American Institute of Steel Construction (A.I.S.C.)

4. American National Standards Institute (A.N.S.I.)

5. American Society for Testing and Materials (A.S.T.M.)

6. American Society of Mechanical Engineers (A.S.M.E.)

7. American Society of Heating, Refrigeration and Air Conditioning Engineers (A.S.H.R.A.E.)

8. American Welding Society (A.W.S.)

9. Architectural Woodworking Institute (A.W.I.)

10. Architectural Aluminum Manufacturer's Association (A.A.M.A.)

11. Commercial Standards (C.S.)

12. Federal Specifications and Standards (F .S.)

13. National Occupations Safety and Health Administration (O.S.H.A.)

14. National Institute for Standards and Technology (N.I.S.T.)

15. Architectural Sheet Metal Manual (SMACNA) - 1987

16. Underwriter's Laboratories (U.L.)

17. U.S. of America Standards Institute (A.S.I.)

18. U.S. Department of Commerce Product Standards (U.S.D.C.P .S.)

1.04 CODE DISCREPANCIES

A. In case of discrepancy between the codes, standards, and specifications listed, the most strict or most stringent requirement shall govern.

END OF SECTION

SECTION 01070
ABBREVIATIONS

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

AAMA	Architectural Aluminum Manufacturer's Association
AASHTO	American Association of the State Highway and Transportation Officials
ACI	American Concrete Institute
ACPA	American Concrete Pipe Association
AFBMA	Anti-Friction Bearing Manufacturer's Association, Inc.
AGMA	American Gear Manufacturer's Association
AHGDA	American Hot Dip Galvanizers Association
AI	The Asphalt Institute
AlA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Moving and Conditioning Association
ANSI	American National Standards Institute, Inc.
APA	American Plywood Association
API	American Petroleum Institute
APHA	American Public Health Association
APWA	American Public Works Association
ASA	Acoustical Society of America
ASAE	American Society of Agriculture Engineers
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
ASLE	American Society of Lubricating Engineers
ASME	American Society of Mechanical Engineers
ASMM	Architectural Sheet Metal Manual
ASSE	American Society of Sanitary Engineers
ASTM	American Society for Testing and Materials
AWPA	American Wood Preservers Association

AWPI	American Wood Preservers Institute
AW S	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturer's Association
CMA	Concrete Masonry Association
CRSI	Concrete Reinforcing Steel Institute
DIPRA	Ductile Iron Pipe Research Association
EIA	Electronic Industries Association
ETL	Electrical Test Laboratories
FBC	Florida Building Code
FDEP	Florida Department of Environmental Protection
FOOT	Florida Department of Transportation
FS	Federal Specifications
IEEE	Institute of Electrical and Electronics Engineers
IES	Illuminating Engineering Society
IPCEA	Insulated Power Cable Engineers Association
ISA	Instrument Society of America
ISO	International Organization for Standardization
MBMA	Metal Building Manufacturer's Association
MTI	Marine Testing Institute
NMM	National Association of Architectural Metal Manufacturer's
NACE	National Association of Corrosion Engineers
NBS	National Bureau of Standards
NEC	National Electrical Code
NEMA	National Electrical Manufacturer's Association
NFPA	National Fire Protection Association
NRCA	National Roofing Contractors Association
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
SMACCNA	Sheet Metal and Air Conditioning Contractors National Association
SSPC	Steel Structures Painting Council
SSPWC	Standard Specifications for Public Works Construction
SFWMD	South Florida Water Management District
UL	Underwriters Laboratories, Inc.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01090
REFERENCE STANDARDS

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. Titles of Sections and Paragraphs

1. Captions accompanying specification sections and paragraphs are for convenience of reference only, and do not form a part of the Specifications.

B. Applicable Publications

1. Whenever in these Specifications references are made to published specifications, codes, standards, or specifications, standards, or requirements of the respective issuing agencies which have been published as of the date of the opening of bids, shall apply; except to the extent that said standards or requirements may be in conflict with applicable laws, other requirements, it shall be understood that wherever no date is specified, only the latest ordinances, or governing codes.

2. No requirements set forth herein or shown on the Drawings shall be waived because of any provision of, or omission from, said standards or requirements.

C. Specialists, Assignments

1. In certain instances, specification text requires (or implies) that specific work is to be assigned to specialists or expert entities, who must be engaged for the performance of that work. Such assignments shall be recognized as special requirements over which the Contractor has no choice or option. These requirements shall not be interpreted so as to conflict with the enforcement of building codes and similar regulations governing the Work; also they are not intended to interfere with local union jurisdiction settlements and similar conventions. Such assignments are intended to establish which party or entity involved in a specific unit of work is recognized as "expert" for the indicated construction processes or operations. Nevertheless, the final responsibility for fulfillment of the entire set of contract requirements remains with the Contractor.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of other requirements of the specifications, all work specified herein shall conform to or exceed the requirements of all applicable codes.

B. References herein to "Building Code" or "FBC" shall mean the Florida Building Code. The latest edition of the code as approved and used by the local agency as of the date of the Notice to Proceed, as adopted by the agency having jurisdiction, shall apply to the Work herein, including all addenda, modifications, amendments, or other lawful changes thereto.

C. In case of conflict between codes reference standards, Drawings and the other Contract , Documents, the most stringent requirements shall govern. All conflicts shall be brought to the attention of the Engineer for clarification and directions prior to ordering or providing any materials or labor. The Contractor shall follow the most stringent requirements.

D. The Contractor shall construct the Work specified herein in accordance with the requirements of the Contract Documents and the referenced portions of those referenced codes, standards, and Specifications listed herein.

E. References herein to "OSHA Regulations for Construction" shall mean Title 29. Part 1926. Construction Safety and Health Regulations, Code of Federal Regulations (OSHA), including all changes and amendments thereto.

F. References herein to "OSHA Standards" shall mean Title 29. Part 1910. Occupational Safety and Health Standards, Code of Federal Regulations (OSHA), including all changes and amendments thereto.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01152
APPLICATION FOR PAYMENT

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. Submit Applications for Payment to the Owner in accordance with the schedule established by the General Conditions of the Contract Documents.

1.02 FORMAT AND DATA REQUIRED

A. Submit applications on the form required by and provided by the Owner, with itemized data typed on 8-1/2 inch X 11-inch white paper continuation sheets.

B. Provide itemized data on continuation sheets:

1. Format, schedules, line items and values (those of the Schedule of Values as accepted by the Owner).

1.03 PREPARATION OF APPLICATION FOR EACH PROGRESS PAYMENT

A. Application Form provided by Owner:

1. Fill in required information, including that for Change Orders executed prior to the cut-off date of the Application.

2. Fill in the summary of dollar values to agree with respective totals indicated on continuation sheets.

3. Execute certification with the signature of a responsible officer of the Contractors firm. If signatory is not a corporate office, a letter from a responsible officer must be submitted prior to processing any Application for Payment. The letter must authorize the signatory to sign Applications for Payment.

B. Continuation Sheets:

1. Fill in the total list of all scheduled component items of Work, with the item number and scheduled dollar value for each item.

2. Fill in the dollar value in each column for each scheduled line item when Work has been performed or products stored.

a. Round off values to the nearest dollar, or as specified for the Schedule of Values.

3. List each Change Order executed prior to the cut-off date of the Application.

a. List by Change Order Number and description, as for an original component item of Work.

1.04 SUBSTANTIATING DATA FOR PROGRESS PAYMENTS

A. The Contractor shall submit suitable information, with a cover letter identifying:

1. Project Name.

2. Application number, date and period of coverage.

3. Detailed list of enclosures.

4. For stored products:

a. Item number and identification as shown on the application.

b. Description of specific material.

5. SBE-M/WBE Participation. Submit Schedule 4, updated and notarized SBE-M/WBE Payment Certification form for each payment made during the period covered.

B. Submit three (3) copies of data with each original application.

C. Submit three (3) copies of record drawings with each original application.

1.05 PREPARATION OF APPLICATION FOR FINAL PAYMENT

A. Fill in Application form as specified for progress payments.

B. Use continuation sheet for presenting the final statement of accounting.

1.06 SUBMITTAL PROCEDURE

A. Submit Applications for Payment to the Owner at the times stipulated.

B. Submit not less than three (3) originals of each Application.

C. When the Owner finds the Application to be properly completed and correct, it will be processed for payment.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01153
CHANGE ORDER PROCEDURE

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. Promptly implement change order procedure:

1. Provide full written data required to evaluate changes.

2. Maintain detailed records of Work done on time and materials/force account basis.

3. Provide full documentation to the Engineer on request.

B. Designate in writing the member of the Contractor's organization:

1. Authorized to accept changes in the Work.

2. Responsible for informing others in the Contractor's employ of the authorization of changes in the Work.

C. The Owner will designate in writing the person authorized to execute Change Orders.

1.02 RELATED REQUIREMENTS

A. General Conditions of the Contract Documents.

B. Supplementary Conditions of the Contract Documents.

C. Section 01152: Application for Payment

1.03 DEFINITIONS

A. Change Order: See the General Conditions and the Supplementary General Conditions of the Contract Documents.

B. Field Order: See the General Conditions and the Supplementary General Conditions of the Contract Documents.

C. Work Directive Change: See the General Conditions and the Supplementary General Conditions of the Contract Documents.

D. Construction Change Authorization: A written order to the Contractor, signed by the Owner and the Engineer, which amends the Contract Documents as described, and authorizes the Contractor to proceed with a change which affects the Contract Price and/or the Contract Time, for inclusion in a subsequent Change Order.

1.04 PRELIMINARY PROCEDURES

A. The Owner or the Engineer may initiate changes by submitting a written Proposal Request to the Contractor. Such requests will include the following:

1. Detailed description of the Change, products, and location of the change in the project.
2. Supplementary or revised Drawings and Specifications.
3. The projected time span for making the change, and a specific statement as to whether overtime work is or is not authorized.
4. A specific period of time during which the requested price will be considered valid.
5. Such request is for information only, and is not an instruction to execute the changes, nor to stop Work in progress.

B. The Contractor may initiate changes by submitting a written proposal to the Engineer containing the following:

1. Description of the proposed changes.
2. Statement of the reason for making the changes.
3. Statement of the effect on the Contract Price and the Contract Time.
4. Statement of the effect of the Work on other prime contractors.
5. Documentation supporting any change in Contract Price or Contract Time, as appropriate.

1.05 CONSTRUCTION CHANGE AUTHORIZATIONS AND WORK DIRECTIVES

A. In lieu of a Proposal Request, the Engineer may issue a construction change authorization or a Work Directive for the Contractor to proceed with a change for subsequent inclusion in the next change order.

B. The Authorization or Directive will describe changes in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change, and will designate the method of determining any change in the Contract Price and any change in the Contract Time.

C. The Owner and the Engineer will sign and date the Construction Change Authorization or Work Directive as authorization for the Contractor to proceed with the changes.

D. The Contractor shall sign and date the Construction Change Authorization or Work Directive to indicate agreement with the terms therein.

1.06 DOCUMENTATION OF PROPOSALS AND CLAIMS

A. Support each quotation for a lump-sum proposal, and for each unit price which has not previously been established, with sufficient substantiating data to allow the Engineer to evaluate quotation.

B. On request, provide additional data to support time and cost computations for:

1. Labor required.

2. Equipment required.

3. Products required:

a. Recommended sources of purchase and unit costs.

b. Quantities required.

4. Taxes, insurance and bonds.

5. Credit for Work deleted from the Contract, similarly documented.

6. Overhead and Profit.

7. Justification for any change in Contract Time in the form of a CPB schedule subnet.

C. Support each claim for additional costs, and for Work done on a time-and-material/force account basis, with documentation as required for a lump sum proposal, plus additional information as follows.

1. Name of Owner's authorized agent who ordered the Work.

2. The date of the order.

3. Dates and times Work was performed and by whom.

4. Time records, summary of hours worked, and hourly rates paid.

5. Receipts and invoices for:

a. Equipment used, listing dates and times of use.

b. Products used, listing quantities.

D. Document requests for product substitution.

1.07 PREPARATION OF CHANGE ORDERS

A. The Engineer will prepare each Change Order on the Owner's standard form.

B. The Change Order will describe changes in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the changes.

C. Change Order will provide an accounting of the adjustment in the Contract Price and the Contract Time.

1.08 LUMP SUM/FIXED PRICE CHANGE ORDER

A. Content of Change Orders will be based on either:

1. The Engineer's Proposal Request and the Contractor's responsive Proposal as mutually agreed between the Owner and the Contractor.

2. The Contractor's Proposal for a change, as recommended by the Engineer.

B. The Owner and the Engineer will sign and date the Change Order as authorization for the Contractor to proceed with the changes.

C. The Contractor shall sign and date the Change Order to indicate agreement with all of the terms therein.

1.09 UNIT PRICE CHANGE ORDER

A. The content of the Change Orders will be based on either:

1. The Engineer's definition of the scope of the required changes.

2. The Contractor's Proposal for a change, as recommended by the Engineer.

3. Survey of completed work.

B. The amounts of the unit prices to be:

1. Those stated in the Agreement of the Contract Documents.

2. Those mutually agreed upon between the Owner and the Contractor.

C. When quantities of each of the items affected by the Change Order can be determined prior to the start of the Work:

1. The Contractor will sign and date the Change Order to indicate agreement with the terms therein.

2. At completion of the change, the Engineer will determine the cost of such Work based on the unit prices and quantities used.

a. The Contractor shall submit documentation to establish the number of units of each item and any claims for a change in Contract Price and/or Contract Time.

3. The Engineer will sign and date the Change Order to establish the change in Contract Price and/or Contract Time.

4. The Owner and the Contractor will sign and date the Change Order to indicate their agreement with the terms therein.

1.10 TIME AND MATERIAL/FORCE ACCOUNT CHANGE ORDER/CONSTRUCTION CHANGE AUTHORIZATION

A. The Engineer and the Owner will issue a Construction Change Authorization directing the Contractor proceed with the changes.

B. At completion of the change, the Contractor shall submit itemized accounting and supporting data as provided in the Article "Documentation of Proposals and Claims" of this Section.

C. The Engineer will determine the allowable costs of such Work, as provided in the General Conditions and the Supplementary General Conditions of the Contract Documents.

D. The Engineer will sign and date the Change Order to establish the change in Contract Price and/or Contract Time.

E. The Owner and the Contractor will sign and date the Change Order to indicate their agreement therewith.

1.11 CORRELATION WITH CONTRACTOR'S SUBMITTALS

A. Periodically revise the Schedule of Values and Application for Payment forms to record each change as a separate item of Work, and to record the adjusted Contract Price.

B. Periodically revise the Construction Schedule to reflect each change in Contract Time:

1. Revise sub-schedule to show changes for other items of Work affected by the change.

C. Upon completion of Work under a Change Order, enter pertinent changes in Record Documents.

PART 2 - PRODUCT (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. All submittals, whether their final destination is to the Owner, Engineer, or other representatives of the Owner, shall be directed through the Engineer. A general summary of the types of submittals and the number of copies required is as follows:

Minimum Copies to Engineer	Type of Submittal
3 (11x17), 1 CD	Construction Progress Schedule
4	Schedule of Payment Values
2	Audio-Video Tapes
4	Progress Pay Applications
3	Supplemental Survey
4	Shop Drawings
3	Preliminary O&M Manuals
4, 1 CD	Final O&M Manuals
2	Certificates of Compliance
2	Warranties
3*	Product Samples
3	Aerial / Site Photos
2	Final Record Drawings (hard copy and CD)
2	Final Tie-In Survey
2	Bacteriological Testing Results

* Unless otherwise required in the specific Section where requested.

1.02 SUBMITTAL PROCEDURES

A. Transmit each submittal with a form acceptable to the Engineer, clearly identifying the project, Contractor, the enclosed material, and other pertinent information specified in other parts of this Section. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.

B. Revise and resubmit submittals as required, identify all changes made since previous submittals. Resubmittals shall be noted as such.

C. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.

1.03 CONSTRUCTION SCHEDULES

A. The scheduling of the work under the Contract shall be performed by the Contractor in accordance with the requirements of this Section. The development of the schedule, the cost loading of the schedule, monthly payment requisitions and project status reporting requirements of the Contract shall employ computerized Critical Path Method (CPM) scheduling. The CPM schedule shall be cost loaded based on the Schedule of Values approved by the Engineer in accordance with the requirements of this Section. The CPM schedule and all reports shall be prepared with computer software, specifically Primavera SureTrak or P3, latest version. No substitutions will be allowed. Method employed shall be precedence diagramming method (PDM).

B. The Contractor shall have the capability of preparing and utilizing the specified progress scheduling techniques. A statement of capability shall be submitted in writing to the Engineer with the return of the executed Agreement to the Owner and will verify that either the Contractor's organization has in-house capability qualified to use the technique or that the Contractor employs a consultant who is so qualified. Capability shall be verified by description of the construction projects to which the Contractor or his consultant has successfully applied the scheduling technique and which were controlled throughout the duration of the project by means of systematic use and updating of the construction progress schedule, the network analysis, and associated reports. The statement shall also provide the contact persons for the referenced projects with current telephone and address information. The submittal shall include the name of the individual on the Contractor's staff or qualified scheduling Consultant who will be responsible for the construction progress schedule and associated reports and for providing the required updating information of same.

C. Activity durations shall be in whole working days (Monday - Friday). The workday calendar date correlation shall be based on an 8-hour day (7a.m. - 4

p.m.) and a 40-hour week with allowance for standard holidays, normal weather, and other special requirements. The City's standard holidays are:

1. New Year's Day
2. Martin Luther King, Jr. Day
3. President's Day
4. Memorial Day
5. Independence Day
6. Labor Day
7. Columbus Day
8. Veterans Day
9. Thanksgiving Day
10. Day after Thanksgiving Day
11. Christmas Holiday
12. Day after Christmas Holiday

Each work activity shall not exceed 20 days duration nor $100,000 unless specifically approved by the Engineer. Procurement activities are exempt from this limitation.

D. If the Contractor desires to make changes in his method of operating which affect the construction progress schedule and related items, he shall notify the Engineer in writing stating which changes are proposed and the reasons for these changes. If the Engineer accepts these changes, in writing, the Contractor shall revise and submit, without additional cost to the Owner, all of the affected portions of the construction progress schedule and associated reports. The construction progress schedule and related items shall be adjusted by the Contractor only after prior acceptance, in writing by the Engineer. Adjustments may consist of changing portions of the activity sequence, activity durations, division of activities, or any other adjustments as may be required. The addition of extraneous, nonworking activities and activities which add restraints to the construction progress schedule shall not be accepted.

E. Except where earlier completions are specified, schedule dates which show completion of all work prior to the contract completion date shall, in no event, be the basis for claim for delay against the Owner by the Contractor.

F. Construction progress schedules and related items which contain activities showing negative float or which extend beyond the contract completion date will not be accepted by the Engineer.

G. Whenever it becomes apparent from the current construction progress schedule and associated reports that delays to the critical path have resulted and the contract completion date will not be met, or when so directed by the Engineer, the Contractor shall take some or all of the following actions at no additional cost to the Owner. The Contractor shall submit to the Engineer for approval, a written statement of the steps they intend to take to remove or arrest the delay to the critical path in the current construction progress schedule.

1. Increase construction manpower in such quantities and crafts as will substantially eliminate the backlog of work;

2. Increase the number of working hours per shift, shifts per day, working days per week, the amount of construction equipment, or any combination of the foregoing, sufficiently to substantially eliminate the backlog of work;

3. Reschedule activities to achieve maximum practical concurrency of accomplishment of activities, and comply with the revised schedule.

H. If when so requested by the Engineer, the Contractor should fail to submit a written statement of the steps they intend to take or should fail to take such steps as reviewed and accepted in writing by the Engineer, the Engineer may direct the Contractor to increase the level of effort in manpower (trades), equipment and work schedule (overtime, weekend and holiday work, etc.) to be employed by the Contractor in order to remove or arrest the delay to the critical path in the current construction progress schedule. The Contractor shall promptly provide such level of effort at no additional cost to the Owner.

I. If the completion of any activity, whether or not critical, falls more than 100 percent behind its previously scheduled and accepted duration, the Contractor shall submit for approval a schedule adjustment showing each such activity divided into two activities reflecting completed versus uncompleted work.

J. Shop Drawings which are not approved on the first submittal or within the time scheduled, and equipment which does not pass the specified tests and certifications shall be immediately rescheduled.

K. The contract time will be adjusted only in accordance with the General Conditions and other portions of the Contract Documents as may be applicable. If the Engineer finds that the Contractor is entitled to any extension of the contract completion date, the Engineer's determination as to the total number of days extension shall be based upon the current construction progress schedule and on all data relevant to the extension. Such data shall be included in the next updating of the schedule and related items. Actual delays in activities which, according to the construction progress schedule, do not affect any contract completion date will not be the basis for a change therein.

L. From time to time it may be necessary for the contract schedule of completion time to be adjusted by the Owner in accordance with the General Conditions and other portions of the Contract Documents as may be applicable. Under such conditions, the Engineer will direct the Contractor to reschedule the work or contract completion time to reflect the changed conditions, and the Contractor shall revise the construction progress schedule and related items accordingly, at no additional cost to the Owner.

M. Available float time may be used by the Owner through the Owner's Engineer.

N. Float or slack time within the construction schedule is not for the exclusive use or benefit of either the Owner or the Contractor, but is jointly owned, as an expiring project resource available to both parties as needed to meet contract milestones and completion dates. The Owner controls the float time and, therefore, without obligation to extend either the overall completion date or any intermediate completion dates the Owner may initiate changes that absorb float time only. Owner initiated changes that affect the critical path on the network diagram shall be the sole grounds for extending the completion dates. Each change request shall include a change impact schedule indicating the effect of this change on the detailed construction schedule. This schedule shall include a narrative description of the schedule change and a computer generated schedule comparison of the current schedule and the schedule revised to indicate the additional work required by the change and its impact on the critical path. Contractor-initiated changes that encroach on the float time may be accomplished only with the Owner's concurrence. Such changes, however, shall give way to Owner-initiated changes competing for the same float time.

O. To the extent that the construction project schedule, associated report, or any revision thereof shows anything not jointly agreed upon or fails to show anything jointly agreed upon, it shall not be deemed to have been accepted by the Engineer. Failure to include on a schedule any element of work required for the performance of this Contract shall not excuse the Contractor from completing all work required within any applicable completion date, not withstanding the review of the schedule by the Engineer.

P. Review and acceptance of the construction progress schedule, and related reports, by the Engineer is advisory only and shall not relieve the Contractor of the responsibility for accomplishing the work within the contract completion date. Omissions and errors in the construction progress schedule, and related reports shall not excuse performance less than that required by the Contract and in no way make the Engineer an insurer of the Contractor's success or liable for time or cost overruns flowing from any shortcomings in the construction progress schedule, and related reports.

Q. Monthly progress payment amounts shall be determined from the monthly progress updates of the CPM schedule activities as correlated to the Schedule of Values.

R. Contractor is responsible for determining the sequence of activities, the time estimates of the detailed construction activities and the means, methods, techniques and procedures to be employed.

S. Detailed network activities shall include: construction activities; the submittal and approval of, of samples of materials and Shop Drawings; the procurement of materials and equipment; the fabrication of materials and equipment and their delivery, installation, testing, start-up and training. Schedule, logic, and operating constraints and sequences shall be as listed in Specifications. Milestones shall be selected by Contractor and Engineer.

T. Contractor shall consult with his Subcontractors (and suppliers) relating to the preparation of his construction plan and Construction Schedule. Subcontractors shall receive copies of the Contractor's Construction Schedule and shall be continually advised of any updates or revisions to the Construction Schedule as the work progresses. When the Contractor submits his Construction Schedule to the Engineer or makes any proposed updates or revisions to such Schedule, it will be assumed by the Owner and Engineer that the Contractor has consulted with and has the concurrence of his Subcontractors. Contractor shall be solely responsible for ensuring that all Subcontractors comply with the requirements of the Construction Schedule for their portions of the work.

U. Responsibility codes shall be established for the Contractor, Engineer, Owner, Subcontractors, suppliers, etc.

1.04 CPM SCHEDULE SUBMITTALS

A. All schedule submittals including revisions and updates shall include three (3) copies of the schedule data plus one (1) copy on electronic media acceptable to the Engineer with label(s) identifying the file name and revision number. The electronic media shall be properly packaged and shipped so as to prevent damage or loss of the data.

B. Preliminary CPM Schedule and revised Original CPM Schedule Submittals: The Preliminary CPM Schedule shall be submitted within fifteen (15) days from the Pre-construction Conference, unless otherwise required by the Contract Documents. Owner and Engineer shall review the Preliminary CPM Schedule within ten (10) days. The Revised Original CPM Schedule shall be submitted by the Contractor within fifteen (15) days from the return of the Preliminary CPM Schedule. Both the Preliminary CPM Schedule and Revised Original CPM Schedule submittals shall have identical format, and shall consist of tabular and graphic reports. The following required reports must be included:

1. Tabular schedule listings which shall be sorted by Activity number, Early Start, Total Float, and Responsibility code, with the following data elements:

a. Activity number/ID

b. Activity description

c. Duration

d. Early start date

e. Early finish date

f. Late start date

g. Late finish date

h. Free float

i. Total float

j. Responsibility

2. A successor-predecessor report which shall identify the successor and predecessor activities for each activity and ties between schedule activities.

3. Project Overview Bar Chart: The project bar chart shall be sorted by Activity number. The overview bar chart shall indicate the major components of the project work and the sequence relations between major components and subdivisions of major components. The overview bar chart shall indicate the relationships and time frames in which the various components of the work will be made substantially complete in order to meet the project milestones and contract completion date.

C. Upon acceptance of the Original CPM Schedule, the Early Start and Early Finish dates for all activities shall be fixed as Planned Start and Planned Finish dates, except where Late Start and Late Finish dates are specifically agreed to by Owner and Engineer, for future variance calculations.

D. Following acceptance of the Original CPM Schedule, the Contractor shall monitor the progress of the work and adjust the schedule each month to reflect actual progress and any changes in planned future activities. Progress shall be evaluated monthly by the Contractor (Subcontractor) and the Engineer. Schedule updates shall reflect the current status of each activity on which work has started or is due to start, based on the preceding construction schedule; show actual progress, to identify those activities started and those completed during the previous period; show the estimated time required to complete *or* the percent complete of each activity started but not yet completed; and reflect any necessary changes to the schedule, network analysis or report to accurately reflect progress. Activities shall not be considered to be complete until they are 100 percent complete. Each schedule update must be complete including all information requested in the Original CPM Schedule Submittal shown in Article 1.04, Paragraph B of this Section.

1. Neither the submission nor the updating of the Contractor's Revised Original CPM Schedule Submittal, nor the submission, updating, change or revision of any other report, curve, schedule or narrative, shall have the effect of amending, modifying, or limiting in any way the Contractors obligations under this Contract. Only a signed, fully executed Change Order can modify these contractual obligations.

2. Upon approval of a Change Order, or upon receipt by the Contractor of authorization to proceed with additional work, the change shall be reflected in the next submittal of the CPM Schedule by the Contractor. The Contractor shall utilize a sub-network in the schedule depicting the changed work and its effect on other activities. The sub- network shall be tied to the main network with the appropriate logic so that a true analysis of the critical Path can be made.

3. Monthly schedule updates shall be submitted with the Application for Progress Payment.

E. A three (3) week rolling schedule shall be provided for each weekly meeting showing the items worked the previous week and those scheduled to be in progress during the next two (2) weeks. The three-week rolling schedule shall use a bar chart format and be accompanied by a tabular report of the activities included. The previous week's schedule shall be indicated as a "target" schedule for comparison.

F. A shop drawing submittal schedule shall be provided.

1.05 SCHEDULE OF PAYMENT VALUES

A. The Contractor shall prepare a preliminary Schedule of Values to correspond with the Project Overview Bar Chart as required under Article 1.04, Paragraph B of this Section for submission at the Pre-construction Conference and a detailed Schedule of Values to correspond with the Revised Original CPM Schedule as required under Article 1.04, Paragraph C in conjunction with the Revised Original CPM 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 CPM Schedule activities, sufficient detailed breakdown shall be provided to meet this requirement. The Engineer shall be the sole judge of acceptable numbers, details, and description of values established. If, in the opinion of the Engineer, 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 Engineer.

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, he/she shall also submit a list covering the cost of materials, delivered and unloaded with taxes paid.

D. The Contractor shall expand or modify the above schedule and materials listing as required by the Engineer's initial or subsequent reviews.

1.06 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 for disassembly and maintenance, type and/or brand of finish or shop coat, grease fittings, 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 21 calendar days of receipt of such Drawings Reviewed.

Shop Drawings will be returned to the Contractor by regular mail, posted no later than 21 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

1. 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 and CPM Activity Number. 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

1. 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.

2. Product data shall include materials of construction, dimensions, performance characteristics, capacities, wiring diagrams, piping and controls, etc.

H. Warranties

1. 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.

I. Work Prior to Review

1. 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.

2. 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.

J. Contractor's Review

1. Only submittals which have been checked and corrected should be submitted to the Contractor by his Subcontractors and vendors. Prior to submitting Shop Drawings to the Engineer, the Contractor shall check thoroughly all such Drawings to satisfy himself that the subject matter thereof conforms to the Drawings and Specifications In all respects.

2. 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. Drawings submitted to the Engineer without Contractor's approval will be returned to the Contractor unreviewed.

K. Contractor's Responsibility

1. The Engineer's review of Shop Drawings will be general and shall not relieve the Contractor of the responsibility for details of design, dimensions, etc., necessary for proper fitting and construction of the Work required by the Contract and for achieving the specified performance.

L. Contractor's Modifications

1. 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.

M. Substitutions

1. Whenever a particular brand or make of material, equipment, or other item is specified, or is indicated on the Drawings, it is for the purpose of establishing a standard of quality, design, and type desired and to supplement the detailed specifications. Any other brand or make which, in the opinion of the Engineer, is equivalent to that specified or indicated may be offered as a substitute subject to the following provisions:

   a. 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 Engineer to determine if the proposed substitution is equal.

   b. Contractor shall submit certified tests, where applicable, by an independent laboratory attesting that the proposed substitution is equal.

c. Contractor shall submit a list of installations where the proposed substitution is equal.

d. Contractor shall fill out and submit a "Substitution Request Form" supplied by Engineer.

e. Where the acceptance of a substitution requires revision or redesign of any part of the Work, all such revision and redesign, and all new Drawings and details required therefore, shall be provided by the Contractor at his own cost and expense, and shall be subject to review of the Engineer.

f. In all cases the Engineer shall be the sole judge as to whether a proposed substitution is to be accepted. The Contractor shall abide by the Engineer's decision when proposed substitute items are judged to be unacceptable and shall in such instances furnish the item, or substitute, as specified. No substitute items shall be used in the Work without written acceptance of the Engineer.

g. Acceptance of any proposed substitution shall in no way release the Contractor from any of the provisions of the Contract Documents.

N. Complete Submittals

1. 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.

O. Shop Drawing Distribution

1. The Contractor shall submit a minimum of 8 (eight) copies of all Shop Drawings to the Engineer for review. Shop drawings will be reviewed, stamped and distributed with the appropriate box checked either "FURNISH AS SUBMITTED", "FURNISH AS CORRECTED", "REVISE AND RESUBMIT" or "RETURNED WITHOUT REVIEW". The distribution of processed Shop Drawings will be as follows:

a. Drawings marked "FURNISH AS SUBMITTED" or "FURNISH AS CORRECTED"

2 copies returned to the Contractor
2 copies transmitted to the Owner
3 copies remain at the Engineer's office
1 copy for the Engineer's field personnel

b. Drawings marked "REVISE AND RESUBMIT"

6 copies returned to the Contractor (or sepia when furnished)
2 copies remain at the Engineer's office

c. Drawings marked "RETURNED WITHOUT REVIEW"

All copies returned to the Contractor

2. If the Contractor requires additional copies of returned Shop Drawings, he shall include extra Drawings in his original submittal. The Engineer will process the Drawings and return them to the Contractor.

P. If during the course of construction, information shown on a shop drawing is revised, the shop drawing shall be resubmitted, for record purposes.

1.07 WARRANTIES

A. Warranties called for in the Contract Documents shall be originals and submitted to the Owner through the Engineer. When warranties are required they shall be submitted prior to request for payment.

B. When advance copies of warranties are requested, they shall be submitted with, and considered as Shop Drawings.

C. Minimum 1-year warrantee from date of acceptance by Owner shall be provided for all equipment, unless stated otherwise in these specifications.

1.08 CERTIFICATES

A. Two copies of certificates of compliance and test reports shall be submitted for requested items to the Engineer prior to request for payment.

1.09 PRODUCT SAMPLES

A. Contractor shall furnish for review all product samples as required by the Contract Documents or requested by the Engineer to determine compliance with the specifications.

B. Samples shall be of sufficient size or quantity to clearly illustrate the quality, type, range of color, finish, or texture and shall be properly labeled to show complete project identification, the nature of the material, trade name of manufacturer, and location of the Work where the material represented by the sample will be used.

C. Samples shall be checked by the Contractor for conformance to the Contract Documents before being submitted to the Engineer and shall bear the Contractor's stamp certifying that they have been so checked. Transportation charges on samples submitted to the Engineer shall be prepaid by the Contractor.

D. Engineer's review will be for compliance with the Contract Documents, and his comments will be transmitted to the Contractor with reasonable promptness.

E. Acceptable samples will establish the standards by which the completed Work will be judged.

1.10 OPERATION AND MAINTENANCE MANUALS

A. The Contractor shall furnish and deliver to the Engineer three (3) preliminary and five (5) final (complete) Operation and Maintenance (O&M) Manuals plus one (1) CD electronic PDF copy for the substantial, complete systems including instructions, technical bulletins, and any other printed matter such as diagrams, prints, or drawings, containing full information required for the proper operations, maintenance, and repair of all Contractor furnished equipment. Also included shall be a spare parts diagram and complete spare parts list. These requirements are a prerequisite to the operation and acceptance of equipment. Each O&M Manual shall be bound together in appropriate three-ring, hard cover binders. A detailed table of contents shall be provided for each Manual. Provide an appropriate ID label on the binder edge. Provide tabs and separate sections for operation, maintenance, spare parts, etc.

B. 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. Extensive pictorial cuts of equipment are required for operator reference in servicing. At a minimum, the O&M manuals shall include:

1. Information contained in the Approved Shop Drawing
2. Installation Instructions
3. Storage Instructions
4. Startup Instructions
5. Shut-Down Instructions
6. Maintenance Instruction and Lubrication schedules
7. Troubleshooting Procedures
8. Detailed Drawings
9. Detailed Electrical Schematics
10. Spare Parts List
11. Name, address, and phone numbers of Service Rep.
12. Warranty

C. Information not applicable to the specific piece of equipment installed on this project shall be stricken from the Manual by the Contractor. Information provided

shall include a source of replacement parts and names of service representatives, including addresses and telephone numbers.

D. When written instructions include Shop Drawings and other information previously reviewed by the Engineer, only those editions which were accepted by the Engineer, and which accurately depict the equipment installed, shall be incorporated in the O&M Manual.

E. Maintenance and Lubrication Schedules: The Contractor shall include in the O&M Manual, for all Contractor furnished mechanical equipment, valves, etc., complete maintenance and lubrication schedules. Separate forms will be submitted for each piece of equipment.

1.11 RECORD DATA AND RECORD DRAWINGS

A. The Contractor shall maintain during the progress of the project accurate records of the location, length and elevation of all pipe lines and piping installed and of all architectural, mechanical and structural features of the Contract. A set of drawings will be provided to the Contractor which shall be kept at the job site for this purpose. Prior to Substantial Completion of the project, as paid for in this Contract, the Contractor shall deliver to the Engineer or Owner the drawings with accurate notations recorded thereon as necessary to revise the drawings for record purposes. The Contractor will be held responsible for the accuracy of such data and shall bear any costs incurred finding utilities as a result of incorrect data furnished by the Contractor. Record drawings shall comply with the City of Lake Worth Water Utilities Department minimum design and construction standards.

1.12 SITE PHOTOGRAPHS AND PRECONSTRUCTION VIDEO

A. PRECONSTRUCTION VIDEO REQUIREMENTS

1. The Contractor shall provide a color audio-video recording showing the entire preconstruction site. All audio/video recordings shall be taken by a professional commercial video photographer. The video photographer shall be an established enterprise that routinely provides these services. The videos shall be in standard electronic compact disc/DVD format, indicating the date, project name, and a brief description of the location where the video was taken. The Contractor shall submit two (2) copies of the preconstruction audio-video to the Engineer for review and approval.

2. Submit qualifications and references of the professional commercial video photographer. Include the names and addresses of two references that the professional video photographer has performed color audio-visual recording on projects of a similar nature, including one within the last six months.

3. No construction shall begin prior to the review and approval of the preconstruction audio-video DVD by the Engineer.

4. The total audio-video recording system and the procedures employed in its use shall be such as to produce a finished product that will fulfill the technical requirements of the project. The video portion of the recording shall produce bright sharp, and clear pictures with accurate colors and shall be free from distortion, and any other form of picture imperfection. All video recordings shall, by electronic means, display on the screen the time of day, the month, day, and year of the recording.

5. The following shall be included with the audio-video documentation:

   a. Coverage is required within and adjacent to the right of way, easements, storage, and staging areas where the work is to be constructed.

   b. Documentation of the conditions of the adjacent properties or any affected structures as a result of the impending construction.

   c. Videos shall be properly identified by video DVD number and project name. Video DVD shall include direction of coverage, the name of the streets or easements, engineering station numbers, date and time of coverage.

   d. Provide a written video DVD log to aid in locating any section of the construction site that may be in question.

   e. The video DVD log shall include sufficient detailed to determine the existing pavement striping and markings to aid in the replacement and restoration of these facilities.

END OF SECTION

SECTION 01400
QUALITY CONTROL

PART 1 - GENERAL

1.01 INSPECTION AT PLACE OF MANUFACTURE

A. Unless otherwise specified, all products, materials, and time and equipment shall be subject to inspection by the Engineer at the place of manufacture.

B. The presence of the Engineer at the place of manufacture however, shall not relieve the Contractor of the responsibility for furnishing products, materials, and equipment which comply with all requirements of the Contract Documents. Compliance is a duty of the Contractor, and said duty shall not be avoided by any act or omission on the part of the Engineer.

1.02 SAMPLING AND TESTING

A. Unless otherwise specified, all sampling and testing shall be in accordance with the methods prescribed in the current standards of the ASTMA 100 as applicable to the class and nature of the article or materials considered; however, the Owner reserves the right to use any generally-accepted system of sampling and testing which, in the opinion of the Engineer, will insure the Owner that the quality of the workmanship is in full accord with the Contract Documents.

B. Any waiver by the Owner of any specific testing or other quality assurance measures, whether or not such waiver is accompanied by a guarantee of substantial performance as a relief from the specified testing or other quality assurance requirements as originally specified, and whether or not such guarantee is accompanied by a performance bond to assure execution of any necessary corrective or remedial Work, shall not be construed as a waiver of any requirements of the Contract Documents.

C. Notwithstanding the existence of such waiver, the Engineer reserves the right to make independent investigations and tests for failure of any portion of the Work to meet any of the requirements of the Contract Documents, which shall be reasonable cause for the Engineer to require the removal or correction and reconstruction of any such work in accordance with the General Conditions.

1.03 SITE INVESTIGATION AND CONTROL

A. The Contractor shall verify all dimensions in the field and shall check field conditions continuously during construction. The Contractor shall be solely

responsible for any inaccuracies built into the Work due to its failure to comply with this requirement.

B. The Contractor shall inspect related and appurtenant Work and shall report in writing to the Engineer any conditions which will prevent proper completion of the Work. Failure to report any such conditions shall constitute acceptance of all site conditions, and any required removal, repair, or replacement caused by unsuitable conditions shall be performed by the Contractor within the scope of the Contract.

C. The Contractor shall check and familiarize himself with the overall general conditions prevailing along the route of construction and at the construction site.

1.04 INSPECTION AND TESTING

A. The Owner will employ and pay for the services of an independent testing laboratory for specified testing as specified by the Engineer.

B. The work or actions of the testing laboratory shall in no way relieve the Contractor of his obligations under the Contract. The laboratory testing work will include such inspections and testing required by the Contract Documents, existing laws, codes, ordinances, etc. The testing laboratory will have no authority to change the requirements of the Contract Documents, nor perform, accept or approve any of the Contractor's Work.

C. The Contractor shall allow the Engineer ample time, safe access and opportunity for inspection and testing materials and equipment to be used in the Work. The Contractor shall advise the Engineer promptly upon placing orders for materials 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 Engineer and his representatives, inspection and testing facilities including labor, and allow proper time for inspecting and testing materials, equipment, and workmanship. The Contractor must anticipate that possible delays may occur in the execution of its 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 Engineer 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.

D. The Owner will bear the cost of all tests, inspections, or investigations undertaken by the order of the Engineer for the purpose of determining conformance with the Contract Documents if such tests, inspections, or investigations are not specifically required by the Contract Documents, and if conformance is ascertained thereby. Whenever nonconformance is determined by the Engineer as a result of such tests, inspections, or investigations, the Contractor shall bear the full cost of any additional tests and investigations, which are ordered by the Engineer to ascertain subsequent conformance with the Contract Documents.

E. Inspections shall be scheduled for regular working hours only, except for special occasions where service interruptions cannot be scheduled during normal working hours. The Engineer shall be given a minimum two (2) full working days notification for scheduled inspections, and a minimum of seven (7) full working days notification for service interruptions.

1.05 RIGHT OF REJECTION

A. The Engineer, acting for the Owner, shall have the right, at all times and places, to reject any articles or materials to be furnished hereunder which, in any respect, fail to meet the requirements of the Contract Documents, regardless of whether the defects in such articles or materials are detected at the point of manufacture or after completion of the Work at the site. If the Engineer or its representative, through an oversight or otherwise, has accepted materials or Work which is defective or which is contrary to the Contract Documents, such materials, no matter in what stage or condition of manufacture, delivery, or erection, may be subsequently rejected by the Engineer for the Owner.

B. The Contractor shall promptly remove rejected articles or materials from the site of the Work after notification of rejection. All costs of removal and replacement of rejected articles or materials as specified herein shall be borne by the Contractor.

1.06 OTHER CONSTRUCTION CONSIDERATIONS

A. Cutting and Patching

1. The Contractor shall perform all cutting and patching of the Work that may be required to make its several parts come together properly and fit it to receive or be received by such other work. The Contractor shall not endanger any work of others by cutting, excavating or otherwise altering their work and shall only cut or alter work with the written consent of the Engineer and of the other Contractors whose work will be affected.

B. Sleeves and Openings

1. The Contractor shall provide all openings, chases, etc., to fit its own work and that of any other Subcontractors and Contractors. All such openings or chases shown on the Contract Drawings, or reasonably implied thereby, or as confirmed or modified by acceptable shop, setting or erecting drawings, shall be provided by the Contractor.

C. Where pipes or conduits are to pass through slabs or walls, or where equipment frames or supports are to be installed as integral part of an opening, the sleeves, openings, forms, or frames shall be furnished by the installer of the pipes, conduits, or equipment, but shall be placed by the Contractor. Where hanger inserts, anchor bolts, and similar items are to be embedded in concrete as an

integral part of a slab or wall, they shall be furnished by the installer of the pipe or other equipment requiring the hanger, etc., but shall be placed by the Contractor.

D. Any cost resulting from correction of defective, ill-timed, or mislocated work or for subsequent work which becomes necessary because of omitted openings, chases, sleeves, frames, inserts, etc., shall be borne by the Contractor or subcontractor responsible therefore. The Contractor shall not arbitrarily cut, drill, alter, damage, or otherwise endanger the work of another Contractor. In no case shall beams, lintels, or other structural members be cut without the proper authorization of the Engineer. The nature and extent of any corrective or additional work shall be subject to the acceptance of the Engineer following consultation with the affected parties.

E. Weather Conditions

1. Work that may be affected by inclement weather shall be suspended until proper conditions prevail. In the event of impending storms, the Contractor shall take necessary precautions to protect all work, materials and equipment from exposure.

F. Fire Protection

1. The Contractor shall take all necessary precautions to prevent fires at or adjacent to the Work, including its own buildings and trailers. Adequate fire extinguisher and hose line stations shall be provided throughout the work area.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01510
TEMPORARY FACILITIES

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. Unless otherwise stipulated, the Contractor shall provide for utilities and services for his own operations as outlined herein. These shall include temporary power, lighting, sanitary facilities, ventilation, etc. required for the duration of the project. Such facilities shall comply with regulations and requirements of OSHA, Florida Power and Light, NEC and all applicable Federal, State and local codes, etc.

B. Prior to installation of temporary sanitary facilities, consult with the Engineer on acceptable locations, access and related facilities

1.02 POWER AND LIGHTING

The Owner will provide 120-volt electrical power at no cost to the Contractor as required to complete the stipulated Work for the duration of the project.

A. If an alternate source of power is required, the Contractor shall be solely responsible for coordinating, installing, maintaining and decommissioning a temporary power source including all associated costs for such service(s). The temporary components shall include but not be limited to temporary wiring, switches, connections and meters.

B. Construction Lighting

1. In addition to providing for a safe construction distribution system, the Contractor shall provide a safe and adequate artificial lighting system for work areas which do not have sufficient natural light.

2. All Work conducted at night or under conditions of deficient daylight shall be suitably lighted to insure proper Work and to afford adequate facilities for inspection and safe working conditions. Temporary lighting shall be maintained during nonworking periods if the area is subject to access by the public or plant personnel.

C. Electrical Connections

1. All temporary connections for electricity shall be subject to review by the Engineer, the Owner, and the power company representative, and shall be removed in like manner at the Contractor's expense prior to final acceptance of the Work.

D. Separation of Circuits

1. Unless otherwise permitted by the Engineer, circuits separate from lighting circuits shall be used for all power purposes.

E. Construction Wiring

1. All wiring for temporary electric light and power shall be properly installed and maintained and shall be securely fastened in place. All electrical facilities shall conform to the requirements of Subpart K of the OSHA Safety and Health Standards for Construction.

1.03 WATER SUPPLY

A. The Owner will provide a source of potable water for construction purposes free of charge. Potable water must be used for construction of the proposed facility upgrades and improvements. Potable water will be provided from point of use hose bibbs located within the project area.

B. Care shall be exercised in the use of water, and provisions shall be made to protect the water supply from contamination and indiscriminate use by unauthorized persons.

C. Potable Water

1. All drinking water on the site during construction shall be furnished by the Contractor for the duration of the project.

1.04 TEMPORARY SANITARY FACILITIES

A. Contractor shall provide temporary sanitary facilities during construction. Facilities shall be maintained and emptied on a regular basis so as to not create a nuisance.

1.05 TEMPORARY VENTILATION

A. The Contractor shall provide and maintain adequate ventilation for a safe working environment. In addition, forced air ventilation shall be provided for the curing of installed materials, humidity control, and the prevention of hazardous accumulations of dust, gases, or vapors. Where warranted, the Contractor shall also provide continuous gas monitors of the type and sensitivity necessary to ensure a safe working environment.

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. The Contractor shall protect all existing utilities and improvements not designated for removal and shall restore damaged or temporarily relocated utilities and improvements to a condition equal to or better than they were prior to such damage or temporary relocation, all in accordance with requirements of the Contract Documents.

B. The Contractor shall verify the exact locations of all utilities shown and shall fully assess the limits of all utilities that may interfere with the Work prior to commencement. All such assessments shall be performed as soon as practicable after award of Contract and, in any event, a sufficient time in advance of construction to avoid possible delays to the Contractor's Work. When such assessment show the utility location as shown to be in error, the Contractor shall so notify the Engineer.

1.02 EXISTING UTILITIES AND IMPROVEMENTS

A. The Contractor shall protect all existing utilities and other improvements which may be impaired or otherwise impacted during construction operations. It shall be the Contractor's responsibility to ascertain the actual location of all existing utilities and other improvements that will be encountered in its construction operations, and to see that such utilities or other improvements are adequately protected from damage due to such operations. The Contractor shall take all possible precautions for the protection of unforeseen utility lines to provide for uninterrupted service and to provide such special protection as may be necessary.

B. Where the proper completion of the Work requires the temporary or permanent removal and/or relocation of an existing utility or other improvement which is shown, the Contractor shall remove and, without unnecessary delay, temporarily replace or relocate such utility or improvement in a manner satisfactory to the Engineer and Owner. In all cases of such temporary removal or relocation, restoration to former location shall be accomplished by the Contractor in a manner that will restore or replace the utility or improvement as nearly as possible to its former locations and to as good or better of a condition than found prior to removal.

C. Existing utility lines that are shown or the locations of which are made known to the Contractor prior to completion of the Work which are to be retained, and all utility lines that are constructed as part of the project shall be protected from

damage and, if damaged, shall be immediately repaired by the Contractor. In case of failure on the part of the Contractor to restore such utilities, 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 thereof will be deducted from any monies due or which may become due the Contractor under this Contract.

D. In the event that the Contractor damages any existing utility lines that are not shown or the locations of which are not made known to the Contractor prior to excavation, a written report thereof shall be made immediately to the Engineer. If directed by the Engineer, repairs shall be made by the Contractor under the provisions for changes and extra Work contained the General Conditions.

E. All costs of locating and repairing damage not due to failure of the Contractor to exercise reasonable care; costs of removing or relocating such utility facilities not shown in the Contract Documents with reasonable accuracy; and costs for equipment on the project which was actually used for that portion of the Work which was necessarily interrupted or idled by Work involved with the removal or relocation of such utility facilities, will be paid for as extra Work in accordance with the provisions of the General Conditions. Compensation shall not include Contractor's costs for the coordination of his activities with the utility company affected. Contractor shall schedule work in such a manner to prevent any delays caused by the utilities companies relocating or supporting their facilities, where applicable. The Contractor will be paid no compensation for any loss of time or delay.

F. All repairs to a damaged improvement are subject to inspection and approval by an authorized representative of the improvement owner before being concealed by backfill or other Work.

1.03 PROTECTION OF ELECTRONICS

A. Where the Contractor’s work generates dust or moisture in the vicinity of electronic devices (new or existing), the Contractor is solely responsible to prevent dust and moisture from entering the devices, whether those devices are turned over to the Owner or not.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01550
SITE ACCESS AND STORAGE

PART 1 - GENERAL

1.01 CONTRACTOR'S SITE ACCESS

A. Unless otherwise required by the Owner, delivery and employee access will be from the site entrance from College Street and such access shall be kept unrestricted.

1.02 CONTRACTOR'S WORK AND STORAGE AREA

A. A designated Contractor staging area shall be provided within the fenced limits of the Lake Worth Water Treatment Facility. Responsibility for protection and safekeeping of equipment and materials within this area will be solely that of the Contractor and no claim shall be made against the Owner by reasons of any act of an employee or trespasser. Should an occasion arise necessitating access to an area occupied by stored equipment and/or materials, the Contractor shall immediately move them. No equipment or materials shall be placed upon the Owner's property until it is acceptable to the Owner.

B. Upon completion of the Contract, the Contractor shall remove from the storage areas all of their equipment, temporary fencing, surplus materials, rubbish, etc., and repair any damage to the staging area.

1.03 SECURITY

A. The Contractor shall care for and protect against loss or damage of all material to be incorporated in the construction for the duration of the project and shall repair or replace damaged or lost materials and damage to structures. The Contractor shall be responsible for providing, maintaining and securing fences for material storage purposes for the duration of the project. Security fencing shall be provided separate from any existing fencing in order to limit access to/from the staging area. It shall be the Contractor’s responsibility to determine the areas and limits of the secured areas to meet the requirements of this Section.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01560
TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 - GENERAL

1.01 EXPLOSIVES AND BLASTING

A. The use of explosives on the Work will not be permitted.

1.02 DUST ABATEMENT

A. The Contractor shall furnish all labor, equipment, and means required and shall carry out effective measures wherever and as often as necessary to prevent its operation from producing dust in amounts damaging to property, cultivated vegetation, or domestic animals, or causing a nuisance to persons living in or occupying buildings in the vicinity. The Contractor shall be responsible for any damage resulting from any dust originating from its operations. The dust abatement measures shall be continued until the Contractor is relieved of further responsibility by the Engineer. No separate payment will be allowed for dust abatement measures and all costs thereof shall be included in the Schedule of Values.

1.03 RUBBISH CONTROL

A. During the progress of the Work, the Contractor shall keep the site of the Work and other areas used by it in a neat and clean condition, and free from any accumulation of rubbish. The Contractor shall dispose of all rubbish and waste materials of any nature occurring at the Work site, and shall establish regular intervals of collection and disposal of such materials and waste. Disposal of all rubbish and surplus materials shall be off the site of construction in accordance with local codes and ordinances governing locations and methods of disposal, and in conformance with all applicable safety laws and the particular requirements of Part 1926 of the OSHA Safety and Health Standards for Construction.

1.04 SANITATION

A. Toilet Facilities

1. Fixed or portable chemical toilets shall be provided wherever needed for the use of employees. Toilets at construction job sites shall conform to the requirements of Part 1926 of the OSHA Standards for Construction.

2. Such facilities shall be made available when the first employees arrive on the Worksite, shall be properly secluded from public observation, and

shall be constructed and maintained in suitable numbers and at such points and in such manner as may be required.

3. The Contractor shall maintain the sanitary facilities in a satisfactory and sanitary condition at all time and shall enforce their use. They shall rigorously prohibit the committing of nuisances on the site of the Work, on the lands of the Owner, or on an adjacent property.

4. The Owner and the Engineer shall have the right to inspect any building or other facility erected, maintained, or used by the Contractor, to determine whether or not the sanitary regulations have been complied with.

B. Sanitary and Other Organic Wastes

1. The Contractor shall establish a regular daily collection of all sanitary and organic wastes. All wastes and refuse from sanitary facilities provided by the Contractor or organic material wastes from any other source related to the Contractor's operations shall be disposed of away from the site in a manner satisfactory to the Engineer and in accordance with all laws and regulations pertaining thereto.

1.05 CHEMICALS

A. All chemicals used during project construction or furnished for project operation, whether defoliant, soil sterilant, herbicide, pesticide, disinfectant, polymer, paint, fuel, solvent, or reactant of other classification, shall show approval of either the U.S. Environmental Protection Agency or the U.S. Department of Agriculture. The handling, storage, use, and disposal of all such chemicals and disposal of residues shall be in strict accordance with all applicable rules and regulations of Federal, State, and local jurisdictional agencies and the printed instructions of the manufacturer and all regulatory requirements. Copies of antidote literature shall be kept at the storage site and at the Contractor's job site office. A supply of antidotes shall be kept at the Contractor's office.

B. Contractor shall maintain a current file of applicable MSDS sheets readily accessible to all employees as required by OSHA Part 1926.

1.06 NOISE CONTROL

A. Noise resulting from the Contractor's work shall not exceed the noise levels and other requirements stated in local ordinances. The Contractor shall be responsible for curtailing noise resulting from his operation. He shall, upon written notification from the Engineer or the noise control officers, make any repairs, replacements, adjustments, and additions and furnish mufflers when necessary to fulfill requirements.

1.07 PRECAUTIONS DURING ADVERSE WEATHER

A. During adverse weather, and against the possibility thereof, the Contractor shall take all necessary precautions so that the work may be properly done and satisfactory in all respects. When required, protection shall be provided by use of tarpaulins, wood, and building paper shelters, or by other acceptable means. The Contractor shall be responsible for all changes caused by adverse weather.

B. The Engineer may suspend construction operations at any time when, in his judgment, the conditions are unsuitable or the proper precautions are not being taken, whatever the weather conditions may be, in any season.

1.08 HURRICANE AND STORM WARNINGS

A. The Contractor shall take all precautions necessary to protect the job site during hurricane and storm watches and warnings.

1.09 PERIODIC CLEANUP AND BASIC SITE RESTORATION

A. During construction, the Contractor shall regularly remove from the site (once a week minimum) all accumulated debris and surplus materials of any kind which results from its operations. Unused equipment and tools shall be stored at the Contractor's yard or base of operations for the project.

B. The Contractor shall perform the cleanup work on a regular basis and as frequently as ordered by the Engineer. 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 Engineer, if partially completed facilities must remain incomplete for some time period due to unforeseen circumstances.

C. Upon failure of the Contractor to perform periodic clean-up and basic restoration of the site to the Engineer's satisfaction, the Engineer may, upon 5 days prior written notice to the Contractor, employ such labor and equipment as it deems necessary for the purpose, and all costs resulting therefrom shall be charged to the Contractor and deducted from amounts of money that it may be due.

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 minute 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. Where the words "provide", "furnish", "include", or "install" are used in the Specifications or on the Drawings, it shall mean to furnish, install, and test complete and ready for operation, the items mentioned. If an item is either called for in the Specifications or called for on the Drawings, it shall be considered sufficient for including same in the Work.

1.02 QUALITY ASSURANCE

A. Source Limitations

1. To the greatest extent possible for each unit of Work, the Contractor shall provide products, materials, or equipment of a singular generic kind from a single source.

B. Compatibility of Options

1. Where more than one choice is available as options for Contractor's selection of a product, material, or equipment, the Contractor shall select an option which is compatible with other products, materials, or equipment already selected. Compatibility is a basic general requirement of product/material selections.

1.03 DESIGN

A. Equipment and appurtenances shall be designed in conformity with the ASME, AIEE, NEMA, and other generally accepted applicable standards and shall be rugged construction and of sufficient strength to withstand all stresses which may occur during fabrication, testing, transportation, installation, and all conditions of operation. All bearings and moving parts shall be adequately protected by bushings or other acceptable means against wear, and provision shall be made for adequate lubrication by readily accessible devices. Details shall be designed for appearance as well as utility. Protruding members, joints, corners, gear covers, etc., shall be finished in appearance.

B. All exposed welds on machinery shall be ground smooth and the comers of structural shapes shall be rounded or chamfered.

1.04 PRODUCT DELIVERY-STORAGE-HANDLING

A. The Contractor shall deliver, handle, and store products in accordance with supplier's written recommendations and by methods and means which will prevent damage, deterioration, and loss including theft. Delivery schedules shall be controlled to minimize long-term storage of products at site and overcrowding of construction spaces. In particular, the Contractor shall provide delivery/installation coordination to ensure minimum holding or storage times for products recognized to be flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other sources of loss.

1.05 TRANSPORTATION AND HANDLING

A. Products shall be transported by methods to avoid product damage and shall be delivered dry and in undamaged condition in supplier's unopened containers or packaging.

B. The Contractor shall provide equipment and personnel to handle products, materials, and equipment including those provided by Owner, by methods to prevent soiling and damage.

C. The Contractor shall provide additional protection during handling to prevent marring and otherwise damaging products, packaging, and surrounding surfaces.

1.06 STORAGE AND PROTECTION

A. Products shall be stored in accordance with supplier's written instructions, with seals and labels intact and legible. Sensitive products shall be stored in weather-tight enclosures and temperature and humidity ranges shall be maintained within tolerances required by supplier's written instructions.

B. For exterior storage of fabricated products, they shall be placed on sloped supports above ground. Products subject to deterioration shall be covered with impervious sheet covering; ventilation shall be provided to avoid condensation.

C. Loose granular materials shall be stored on solid surfaces in a well-drained area and shall be prevented from mixing with foreign matter.

D. Storage shall be arranged to provide access for inspection. The Contractor shall periodically inspect to assure products are undamaged and are maintained under required conditions.

E. Storage shall be arranged in a manner to provide access for maintenance of stored items and for inspection.

F. Where applicable, materials stored in a wellfield zone are subject to daily inspection by the Owner. Inspections will be performed to ensure compliance with facility wellfield permits.

G. Contractor shall provide Material Safety Data Sheets (MSDS) for stored products in accordance with Florida Right to Know Law and shall maintain a clearly marked binder of all applicable MSDS for use by the Contractor’s employees as required by OSHA Part 1926.

H. Containers storing liquid products shall be stored in secondary containment pallets or in a secondary containment area that is capable of containing 110% volume of the fluid and shall be inspected daily.

1.07 MAINTENANCE OF STORAGE

A. Stored products shall be periodically inspected on a scheduled basis. The Contractor shall maintain a log of inspections and shall make said log available to the Engineer on request.

B. The Contractor shall verify that storage facilities comply with supplier's product storage requirements.

C. The Contractor shall verify that supplier-required environmental conditions are maintained continually.

D. The Contractor shall verify that surfaces of products exposed to the elements are not adversely affected and that any weathering of finishes is acceptable under requirements of Contract Documents.

1.08 MAINTENANCE OF EQUIPMENT STORAGE

A. For mechanical and electrical equipment in long-term storage, the Contractor shall provide a copy of the supplier's service instructions to accompany each item, with notice on enclosed instruction shown on exterior of package.

B. Equipment shall be serviced on a regularly scheduled basis, and a log of services shall be maintained and submitted as a record document to the Engineer.

1.09 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.

1.10 SPECIAL TOOLS

A. For each type of equipment being 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.

1.11 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.

1.12 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.

1.13 SALVAGED AND EXCAVATED MATERIALS

A. In the absence of special provisions in other Sections of the Specifications, salvage materials, equipment, or supplies that occur are the property of the Owner and shall be cleaned and stored as directed by the Engineer.

B. All excavated materials needed for backfilling operation shall be stored on site. Where additional area is needed for stockpiling, it shall be obtained by the Contractor.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01650
FACILITY STARTUP

PART 1 - GENERAL

1.01 DEFINITIONS

A. Facility Startup: Includes putting Project in operating order, cleaning, adjusting and balancing equipment, initial operation (startup) of equipment item, operating equipment, starting systems, operation of systems, testing of equipment and systems, and demonstration and verification of the completed facility as a unit.

B. Functional Test: A test or tests in the presence of the Engineer and/or Owner to demonstrate that the installed equipment or system meets manufacturer's installation and adjustment requirements and other requirements specified including, but not limited to, noise, vibration, alignment, speed, proper electrical and mechanical connections, thrust restraint, proper rotation, and initial servicing.

C. Operation Period: The operation period begins when the facility has been successfully started up as defined under Paragraph Startup Test Period and has met all Substantial Completion requirements.

D. Performance Test: A test performed in the presence of the Engineer and/or Owner and after any required functional test specified, to demonstrate and confirm that the equipment and/or system meet the specified performance requirements.

E. Significant Interruption: May include any of the following events:

1. Failure of Contractor to maintain qualified onsite startup personnel as scheduled.

2. Failure to meet specified performance for more than two consecutive hours.

3. Failure of any critical equipment unit, system, or subsystem that is not satisfactorily corrected within five hours after failure.

4. Failure of noncritical unit, system, or subsystem that is not satisfactorily corrected within eight hours after failure.

5. As may be determined by Engineer.

F. Startup Test Period:

1. Startup of the entire facility or any portion thereof includes coordinated operation of the facilities by the Contractor, Subcontractors, Owner operating personnel, and manufacturer's representatives for equipment items and systems after all required functional tests have been completed

and those performance tests deemed necessary for the safe operation of the entire facility have been completed.

2. Startup of the system or any portion thereof shall be considered complete when, in the opinion of the Engineer, the system or designated portion has operated in the manner intended for seven continuous days without significant interruption. This period is in addition to any training, functional, or performance test periods specified elsewhere. A significant interruption will require the startup then in progress to be stopped and restarted after corrections are made.

G. System:

1. The overall process, or a portion thereof, that performs a specific function. A system may consist of two or more subsystems as well as two or more types of equipment.

1.02 SUBMITTALS

A. Administrative Submittals:

1. Functional and performance test schedules and plan for equipment, units, and systems at least 14 days prior to start of related testing. Include test plan, procedures, and log format.

2. Schedule and plan of facility startup activities at least 14 days prior to commencement.

B. Quality Control Submittals:

1. Manufacturer's Certificate of Proper Installation as required.

2. Test Reports: Functional and performance testing, in format acceptable to Engineer and certification of functional and performance test for each piece of equipment or system specified.

3. Certifications of Calibration: Testing equipment.

1.03 CONTRACTOR FACILITY STARTUP RESPONSIBILITIES

A. General:

1. Perform Work for tests specified. Refer to individual equipment specifications for specific startup and testing requirements.

2. Demonstrate proper installation, adjustment, function, performance, and operation of equipment, systems, control devices, and required interfaces individually and in conjunction with process instrumentation and control system.

1.04 OWNER/ENGINEER FACILITY STARTUP RESPONSIBILITIES

A. General:

1. Review Contractor's test plan and schedule.

2. Witness each functional or performance test.

3. Coordinate other plant operations, if necessary, to facilitate Contractor's tests.

4. Provide water, power, chemicals for bulk tanks and diesel fuel for new diesel fuel tank, and other items as required for testing, unless otherwise indicated. The Contractor shall be responsible for providing all chemicals for disinfection of storage tanks and pipelines.

B. Startup Test Period:

1. Operate process units and devices, with support of Contractor.

2. Provide sampling, labor, and materials as required and provide laboratory analyses.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 TESTING PREPARATION

A. General:

1. Complete Work associated with the unit and related processes before testing, including related manufacturer's representative services.

2. Furnish qualified manufacturer's representatives when required to assist in testing. Manufacturer's representative shall provide certification of proper installation prior to initiating startup activities.

3. Utilize the Manufacturer's Certificate of Proper Installation Form at the end of this Section supplemented as necessary, to document functional and performance procedures, results, problems, and conclusions.

4. Schedule and attend pretest (functional and performance) meetings related to test schedule, plan of test, materials, chemicals, and liquids required, facilities' operations interface, Engineer and Owner involvement.

5. Designate and furnish one or more persons to be responsible for coordinating and expediting Contractor's facility startup duties. The person

or persons shall be present during facility startup meetings and shall be available at all times during the facility startup period.

6. Provide temporary valves, gauges, piping, test equipment and other materials and equipment required to conduct testing.

B. Cleaning and Checking: Prior to starting functional testing:

1. Calibrate testing equipment for accurate results.

2. Inspect and clean equipment, devices, connected piping, and structures so they are free of foreign material.

3. Lubricate equipment in accordance with manufacturer's instructions.

4. Turn rotating equipment by hand and check motor-driven equipment for correct rotation.

5. Open and close valves by hand and operate other devices to check for binding, interference, or improper functioning.

6. Check power supply to electric-powered equipment for correct voltage.

7. Adjust clearances and torques.

8. Test piping for leaks.

9. Obtain complete Manufacturer's Certificate of Proper Installation.

C. Ready-to-test determination will be by Engineer and/or Owner based at least on the following:

1. Notification by Contractor of equipment and system readiness for testing.

2. Acceptable testing plan.

3. Acceptable Operation and Maintenance Manuals.

4. Receipt of Manufacturer's Certificate of Proper Installation, if specified.

5. Adequate completion of Work adjacent to, or interfacing with, equipment to be tested.

6. Availability and acceptability of manufacturer's representative, when specified, to assist in testing of respective equipment, and satisfactory fulfillment of other specified manufacturers' responsibilities.

7. Equipment and electrical tagging complete.

8. All spare parts and special tools delivered to Owner.

3.02 FUNCTIONAL TESTING

A. General:

1. Begin testing at a time mutually agreed upon by the Owner and/or Engineer, manufacturer's representative(s), and Contractor.

2. Notify in writing Owner, Engineer, and manufacturer's representative at least 14 days prior to scheduled date of functional tests.

3. Separate items of equipment demonstrated to function properly during subsystem testing may require no further functional test if documentation of subsystem testing is acceptable to Engineer.

4. Conduct functional test until each individual component item or system has achieved 2 continuous hours of satisfactory operation. Demonstrate all operational features and controls function during this period while in automatic modes.

5. If, in Engineer's opinion, each system meets the functional requirements specified, such system will be accepted as conforming for purposes of advancing to performance testing phase, if required. If, in Engineer’s opinion, functional test results do not meet requirements specified, the systems will be considered as nonconforming.

6. Performance testing shall not commence until the equipment or system meets functional tests specified.

3.03 PERFORMANCE TESTING

A. General:

1. Begin testing at time mutually agreed upon by the Owner, and/or Engineer, manufacturer's representative(s), and Contractor, as appropriate.

   a. Engineer will be present during test.

   b. Notify Engineer and Owner at least 14 days prior to scheduled date of test.

2. Follow approved testing plan and detailed procedures specified.

3. Unless otherwise indicated, furnish all labor, materials, and supplies for conducting the test and taking all samples and performance measurements.

4. Prepare performance test report summarizing test method. Include test logs, pertinent calculations, and certification of performance.

3.04 STARTUP TEST PERIOD

A. Test Reports: As applicable to the equipment furnished, certify in writing that:

1. Necessary hydraulic structures, piping systems, and valves have been successfully tested.

2. Equipment systems and subsystems have been checked for proper installation, started, and successfully tested to indicate that they are operational.

3. Systems and subsystems are capable of performing their intended functions.

4. Facilities are ready for intended operation.

B. Attend planning meetings and arrange for attendance by key major equipment manufacturer representatives as required by the Contract Documents.

C. Designate and furnish one or more persons to be responsible for coordinating and expediting Contractor's facility startup duties.

D. When facility startup has commenced, schedule remaining Work so as not to interfere with or delay the completion of facility startup. Support the facility startup activities with adequate staff to prevent delays and process upsets. This staff shall include, but not be limited to, major equipment and system manufacturers' representatives, Subcontractors, electricians, instrumentation personnel, millwrights, pipe fitters and plumbers.

E. Supply and coordinate specified manufacturer's facility startup services.

F. Make adjustments, repairs, and corrections necessary to complete facility startup.

G. After the facility is operating, complete the testing of those items of equipment, systems, and subsystems which could not be or were not adequately or successfully tested prior to startup test period.

3.05 PARTIAL UTILIZATION

A. After successful performance testing of a particular equipment type or system, Owner may elect to start up a portion of the equipment or system for continuous operation.

3.06 CONTINUOUS OPERATIONS

A. Owner will accept equipment and systems as substantially complete and ready for continuous operation only after successful facility startup is completed and documented, and reports submitted, and manufacturers' services completed for

training of Owner's personnel. Manufacturer's representatives shall provide operational support to the Owner for a period up to 30 days after substantial completion to ensure Owner staff is completely and adequately trained to operate the systems and that the system is meeting all specified performance criteria. Contractor shall coordinate and cooperate with manufacturer's representatives and Owner to correct and/or repair any deficiencies in the contractors work related to the systems.

END OF SECTION

MANUFACTURER'S CERTIFICATE OF PROPER INSTALLATION

OWNER _____ EQPT SERIAL NO. _____

EQPT TAG NO. _____ EQPT/SYSTEM _____

PROJECT NO. _____ SPEC. SECTION _____

I hereby certify that the above - referenced equipment/system has been:

(Check Applicable)

___ Installed in accordance with Manufacturer's recommendations.
___ Inspected, checked, and adjusted.
___ Serviced with proper initial lubricants.
___ Electrical and mechanical connections meet quality and safety standards.
___ All applicable safety equipment has been properly installed.
___ System has been performance tested, and meets or exceeds specified performance requirements. (When complete system of one manufacturer)

Comments: _____

_____

_____

_____

_____

_____

_____

_____

I, the undersigned Manufacturer's Representative, hereby certify that I am (i) a duly authorized representative of the Manufacturer, (ii) empowered by the manufacturer to inspect, approve, and operate his equipment and (iii) authorized to make recommendations required to assure that the equipment furnished by the manufacturer is complete and operational, except as may be otherwise indicated herein. I further certify that all information contained herein is true and accurate.

Date: _____, 20 __

Manufacturer: _____

By Manufacturer's Authorized Representative: _____
(Authorized Signature)

SECTION 01700
PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 FINAL CLEANUP

A. The Contractor shall promptly remove from the vicinity of the completed Work, all rubbish, unused materials, concrete forms, construction equipment, and temporary structures and facilities used during construction. Final acceptance of the Work by the Owner will be withheld until the Contractor has satisfactorily complied with the foregoing requirements for final cleanup of the project site.

1.02 CLOSEOUT TIMETABLE

A. The Contractor shall establish dates for equipment testing, acceptance periods, and onsite instructional periods (as required under the Contract). Such dates shall be established not less than two weeks prior to beginning any of the foregoing items, to allow the Owner, the Engineer, and their authorized representatives sufficient time to schedule attendance at such activities.

1.03 FINAL ACCEPTANCE PREREQUISITES

A. Prior to requesting the Owner's final inspection for certification of final acceptance and final payment, the following shall be completed, and any known exceptions shall be listed in the request for final inspection:

1. Submit final payment request, accounting for all changes to the Contract price.

2. Submit final warranty of title, and consent of surety for final payment.

3. Conform with Article 1.04 of this Section.

4. Perform the final repair and cleaning in conformance with Articles 1.06 and 1.07 of this Section.

5. Change over all utilities to the Owner's name.

1.04 FINAL SUBMITTALS

A. Before the final acceptance of the project, the Contractor shall submit to the Engineer (or to the Owner if indicated) certain records, certifications, etc., which are specified elsewhere in the Contract Documents. Missing, incomplete, or unacceptable items, as determined by the Engineer or the Owner, shall constitute

grounds for withholding final payment to the Contractor. A partial list of such items appears below, but it shall be the Contractor's responsibility to submit any other items which are required in the Contract Documents:

1. Written Test results of project components, where required.

2. Performance affidavits for equipment, where required.

3. During the entire construction operation, the Contractor shall maintain records of all deviations from the Drawings and Specifications and shall prepare therefrom record drawings showing correctly and accurately all changes and deviations from the Work made during construction to reflect the Work as it was actually constructed. General requirements for record documents are indicated in individual sections of these Specifications. The specific submittal requirements are indicated in Section 01720. The Contractor shall not use record documents for construction purposes and shall protect from deterioration and loss in a secure fire-resistive location. The Contractor shall provide access to record documents for the Engineer's or Owner's inspection during normal working hours.

4. Written guarantees, where required.

5. Certificates of inspection and acceptance by local governing agencies having jurisdiction.

6. Releases from all parties who are entitled to claims against the subject project, property, or improvement pursuant to the provisions of law.

7. Corrected, as-built O&M manuals.

8. Bonds for roofing, maintenance, etc., as required.

9. Any occupancy permits, operating certifications, final inspection or test certificates, and similar releases enabling the Owner's full and unrestricted use of the Work and access to the services and utilities.

10. Final meter readings for utilities, measured record of stored fuel, and similar data as of the time of substantial completion or when the Owner takes possession of and responsibility for corresponding elements of the Work.

1.05 PUNCH LISTS

A. Final cleaning and repairing shall be scheduled upon completion of the project.

B. The Engineer will make his final inspection whenever the Contractor has notified the Engineer that the work is ready for the inspection. Any work not found acceptable and requiring cleaning, repair, and/or replacement will be noted on the "Punch" list. Work that has been inspected and accepted by the Engineer shall be maintained by the Contractor, until final acceptance of the entire project.

C. Whenever the Contractor has completed the items on the punch list, he shall again notify the Engineer that it is ready for final inspection. This procedure will continue until the entire project is accepted by the Engineer. The "Final Payment" will not be processed until the entire project has been accepted by the Engineer and all of the requirements in Article 1.03 entitled "Final Submittals" have been satisfied.

1.06 TOUCH-UP AND REPAIR

A. The Contractor shall touch-up and repair damage to all field painted and factory finished equipment. Touch-up of equipment panels, etc., shall match as nearly as possible the original finish. If in the opinion of the Engineer the touch-up work is not satisfactory, the Contractor shall repaint the item.

1.07 CLEANING

A. Following certification of substantial completion and immediately before the final acceptance inspection of the project, the Contractor shall accomplish the cleaning and final adjustments of the various building and project site components as follows:

1. Remove temporary protection devices and facilities which were installed during the course of the work to protect previously completed work for the remainder of the construction period.

2. Clean all glass and adjust all windows and doors for proper operation.

3. Clean and lubricate all finish hardware after adjustment for proper operation.

4. Touch up marks or defects in painted surfaces, and touch up any similar defects in factory finished surfaces.

5. Wax all resilient flooring materials.

6. Remove bitumen from gravel stops, fascias, and other exposed surfaces.

7. Remove all stains, marks, fingerprints, soil, spots, and blemishes from all finish surfaces, tile, stone, brick, and similar surfaces.

8. Clean project site, including landscape, development areas of litter and foreign substances. Sweep paved areas to a broom clean condition; remove stains, petrochemical spills and other foreign deposits. Rake grounds which are neither planted nor paved, to a smooth, even-textured surface.

B. Contractor shall comply with safety standards and governing regulations for cleaning operations. Do not burn waste materials at the site, or bury debris or excess materials, or discharge volatile or other harmful or dangerous materials

into drainage systems; remove waste materials from the site and dispose of in a lawful manner.

C. Where extra materials of value remaining after completion of the associated work have become the Owner's property, dispose or store at the site as directed by the Owner.

1.08 MAINTENANCE AND GUARANTEE

A. The Contractor shall comply with all maintenance and guarantee requirements of the Contract Documents.

B. Replacement of earth fill or backfill, where it has settled below the required finish elevations, shall be considered as a part of such required repair work. and any repair or resurfacing constructed by the Contractor which becomes necessary by reason of such settlement shall likewise be considered as a part of such required repair work unless the Contractor shall have obtained a statement in writing from the affected private owner or public agency releasing the Owner from further responsibility in connection with such repair or resurfacing.

C. The Contractor shall make all repairs and replacements promptly upon receipt of written order from the Owner. If the Contractor fails to make such repairs or replacements promptly, the Owner reserves the right to do the Work and the Contractor and his surety shall be liable to the Owner for the cost thereof.

1.09 GREASE AND OIL

A. All grease and oil required for testing of equipment shall be furnished by the Contractor. The Contractor shall also furnish a one-year supply of lubricants including grease and oil of the type recommended by the manufacturer for each item of equipment supplied.

1.10 TOOLS

A. Any special tools (including grease guns or other lubricating devices) which may be necessary for the adjustment, operation, and maintenance of any equipment shall be furnished with the respective equipment. The Contractor shall furnish a complete list of tools and instructions for their use, recommended by the manufacturer or supplier with the Shop Drawing Submittal.

1.11 SPARE PARTS

A. Spare parts for equipment shall be furnished where indicated in the equipment specifications. Spare parts shall be identical and interchangeable with original parts. Parts shall be supplied and prepared for storage in clearly identified containers, except large or bulky items which may be wrapped in polyethylene.

B. The parts shall be stored separately in a locked area, maintained by the Contractor, and shall be delivered to the Owner at a location designated by the Owner. The Contractor shall furnish an inventory listing all spare parts for each piece of equipment in the form included at the end of this section.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

SPARE PARTS INVENTORY Page ____of _____

SUMMARY SHEET

EQUIPMENT NO. _____ DATE _____

LOCATION _____ REV._____

NAME _____

PARTS SUPPLIER _____

ADDRESS _____

PHONE (___) _____

SPARE PARTS INVENTORY:

Stock No.	Description

NOTE: Use additional sheets as required.

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 hand mark the record 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 utility features which are revealed during the course of construction. Special attention shall be given to recording the horizontal and vertical location of all buried utilities that differ from the locations indicated, or which were not indicated on the Contract Drawings. Said record drawings shall be supplemented by any detailed sketches as necessary or directed to indicate, fully, the Work as actually constructed. These master record drawings 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. Record drawings shall be accessible to the Engineer at all times during the construction period.

D. Periodic payments must be accompanied by an updated copy of the record drawings. Pay Applications submitted without record drawings shall not be proceeded by the Engineer, until the drawings are received. The Contractor shall submit one set of record drawings.

E. Final payment will not be acted upon until the Contractor has prepared and delivered record as-built drawings to the Engineer. Said up-to-date record drawings shall be in the form of a set of prints with carefully plotted information hand marked in red.

F. Upon substantial completion of the Work and prior to final acceptance, the Contractor shall finalize and deliver a complete set of record drawings to the Engineer, conforming to the construction records of the Contractor. This set of drawings shall consist of hand marked 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 Engineer and the Owner.

1.02 MARKING DEVICES

A. The Contractor shall provide indelible ink pens for recording information in a color code.

1.03 RECORDING

A. Label each document "PROJECT RECORD" in neat large printed letters.

B. Record information concurrently with the progress of construction.

C. Legibly mark drawings to record actual construction. Provide the opportunity for the Engineer's surveyor to obtain the following information. \

D. Piping and Tubing: Record drawings shall show the following field information:

1. Show material used to construct lines.

2. Show location of new tees, crosses, bends, terminal ends, valves, air release valves, and sampling points, etc., by distances from known above ground reference points (manholes, catch basins, and structures).

3. Show location of all sleeves and casing pipes.

4. Show all variations in required cover over pipe.

5. Show elevation, horizontal control and material of all water mains, sewer lines, electric conduit, chemical feed lines, etc., crossed or otherwise exposed during construction.

E. Structures: Record drawings show the following information:

1. All slab elevations (top, bottom, intermediate).

2. Top elevations of all beams and/or platforms.

3. All horizontal locations including at least two corners for structures.

4. For buildings shown ridge elevation and eave elevation.

F. Equipment: Record drawings shall show the following information:

1. Centerline elevations of all new pipes and equipment.

2. Elevation of suction bells or pump intakes.

3. Equipment top elevations.

4. Distance between pumps (centerline to centerline).

5. Horizontal control for at least one corner, or center.

6. All equipment base elevations.

7. All motor and pump nameplate data. (This can be provided in summary form on a separate sheet).

8. Mechanical equipment type, model, manufacturer, serial numbers and locations.

G. Exterior Electrical/Instrumentation Conduits: Record drawings shall show the following information:

1. All horizontal and vertical control of all buried conduit.

2. Conduit material and size for all conduits (shall be shown on the conduit/cable schedule).

3. Number and sizes of wires in each conduit (shall be shown on the conduit/cable schedule).

4. Grounding system.

5. All primary element and transmitter nameplate data. (This can be provided in summary form on a separate sheet).

H. Field changes of dimension and detail.

I. Changes made by Field Order, Change Order or Construction Change Directive.

J. Details not shown on the original Contract Drawings.

K. Legibly mark each Section of the Specifications and Addenda to record:

1. Manufacturer, trade name, catalog number, and supplier of each item actually installed.

2. Changes made by Field Order, Change Order, or Work Directive.

1.04 SUBMITTAL

A. Prior to Substantial Completion, submit Record Documents to the Engineer for review.

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.

C. Initially two (2) certified paper prints are to be submitted for review. Following review by the Engineer and Owner, any comments are to be addressed. All proposed data must be crossed out and record data identifiers must be added to the legend and shown on each plan/profile sheet.

D. Completed operation and maintenance manuals must be submitted with final record drawings.

E. Flow test results for all new fire hydrants are required.

1.05 DOCUMENT SECURITY AND LABELING

A. Contractor shall abide by the following regulations:

1. FS Chapter 281.301- Security systems; records and meetings exempt from public access or disclosure.

2. FS Chapter 119.07 - Inspection, examination, and duplication of records; exemptions.

B. Documents generated and/or used for this project that fall within the listed regulations above Must Be Labeled With The Following Verbiage:

City of Lake Worth Water Utilities Document

CONFIDENTIAL

Sensitive Security Information
NOT FOR PUBLIC DISCLOSURE

In Accordance with:
FS, Chapter 281.301
FS, Chapter 119.07

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01721
DISINFECTION AND BACTERIOLOGICAL TESTING

PART 1 – GENERAL

1.1 WORK INCLUDED

A. This Section covers the work necessary to disinfect the potable water facilities and obtaining subsequent clearances for operation issued by the Owner and all state/local health agencies having jurisdiction over the facility as may be applicable.

B. See General Conditions and Division 1, GENERAL REQUIREMENTS, which contain information and requirements that apply to the work specified herein and are mandatory for this project.

C. Any methods specified herein are given as examples for discussion purposes. The constraining requirements are ultimate passage of bacterial tests, protection of materials, health and the environment and conservation of water. The Contractor shall submit, in accordance with the specified shop drawings procedure, a procedure plan fro disinfection and testing for achieving the requirements specified herein.

PART 2 – PRODUCTS

2.1 GENERAL

A. The Contractor shall furnish all labor, chemicals and equipment necessary for completing the disinfection process. The use of chlorine solutions is required as the active disinfecting agent. The Contractor shall be solely responsible for the safe and proper handling of the chlorine compounds or other hazardous chemicals utilized. Only chlorine from a sodium solution will be allowed. The use of calcium hypochlorite will not be allowed. Direct injection and/or use of chlorine gas is prohibited. Sodium hypochlorite solutions must be premixed and fed to tanks or piping and not placed dry.

PART 3 – EXECUTION

3.1 GENERAL

A. All components of this project, which will contain, transport or otherwise contact potable water shall be disinfected and bacteriologically cleared. The CONTRACTOR is responsible for performing all functions for disinfection. Initial tests for bacteriological clearance will be performed by the ENGINEER and OWNER. Failures of the tests shall be considered the responsibility of the

CONTRACTOR and reapplication of disinfectants and retesting shall be at the CONTRACTOR's sole expense.

B. Prior to application of disinfectants, tanks and pipelines shall be thoroughly cleansed of loose and suspended material. Pipelines shall be flushed until clear of suspended solids and color. The CONTRACTOR is expected to exercise caution in construction of the facilities to minimize retention of debris and subsequent excessive flushing requirements. The CONTRACTOR shall ensure that the water he utilizes is suitable for flushing and disinfecting the facilities.

3.2 DISINFECTION METHODS

A. Pipelines: See Section 15995, entitled "Pipeline Testing and Disinfection".

B. Tanks and Water Holding Structures:

1. Tanks shall be disinfected by of the following method and shall follows the criteria found in AWWA C652:

a. A solution containing 200 ppm of available chlorine shall be sprayed or brushed onto the interior surfaces of the tank and allowed to remain 3 hours or until dry before being rinsed off. A solution containing 200 ppm of available chlorine can be prepared by diluting a 1 percent sodium hypochlorite solution to 50 parts of water.

C. Disposal of chlorinated water shall be in accordance with all applicable regulations. Contractor shall submit a Disposal Plan to Engineer for review and approval prior to initiating the disinfection process.

D. Testing:

1. After tanks, equipment or pipelines have been cleaned, disinfected and refilled with fresh water from the system, the Contractor shall pay for all costs associate with sample collection and testing by an approved laboratory for conformance to bacterial limitation for public drinking water supplies. As a minimum, two samples on each of 2 consecutive days from each separable part of pipeline will be obtained and analyzed by standard procedures and as outlined by the state and local regulatory agencies. Sampling points shall be as directed by the Engineer. If the minimum samples and required above are not bacterially clear, the disinfectant testing operation shall be repeated at the CONTRACTOR's expense.

2. All pipes and water holding structures shall be disinfected and tested.

E. Disinfection shall not be conducted until all equipment has been performance tested. If any water holding structure, tank or pipeline is disassembled or entered, cleaning, disinfections and bacteriological testing must be repeated. Following completion of cleaning and disinfection of tanks, equipment and pipelines, refilling these items shall be accomplished by processing potable water from the distribution system.

END OF SECTION

DIVISION 2

SITE WORK

SECTION 02050
DEMOLITION

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall remove and dispose of or salvage any existing structure, walls, masonry, piping, conduits, electrical equipment, mechanical equipment, or appurtenances or portions thereof, as shown on the Drawings or required to complete the project.

B. All materials designated for disposal shall, when released by the Engineer, become the Contractor's property and shall be removed from the site to the Contractor's own place of disposal.

1.02 SUBMITTALS

A. The Contractor shall submit for review, in accordance with Section entitled "Submittals" the proposed methods, equipment and operation sequence. 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 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.

C. The Contractor shall repair damage done to facilities to remain, or to any property belonging to the Owner.

1.04 DUST CONTROL

A. The Contractor shall use 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. Existing electrical and mechanical equipment to remain shall be protected from damage, dust, and debris.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 GENERAL

A. Prior to commencing work, the Contractor shall check all underground and exposed existing utility and process piping and all equipment in any way associated or in the proximity to the items to be removed and shall verify that the piping is inactive (abandoned) and that electric power to equipment, lighting, controls, etc., has been permanently disconnected. Active services shall be brought to the attention of the Owner for proper action.

B. The Contractor shall remove all equipment and accessories in a workmanlike manner and shall take all necessary precautions to avoid damaging existing equipment, piping, and structure which are to be retained. Damages shall be repaired or replaced at the expense of the Contractor.

3.02 UNAUTHORIZED REMOVAL

A. Any equipment, piping and appurtenances removed without proper authorization, shall be replaced to the satisfaction of the Owner at no cost to the Owner.

3.03 DEMOLITION

A. The Owner may desire to keep certain items of existing equipment which are to be dismantled and removed during the course of construction. Prior to removal of any existing equipment or piping from the site of work, the Contractor shall ascertain from the Engineer whether or not the particular item or items are to be salvaged. Items to be salvaged shall be stockpiled on the site, or delivered to a storage area at a location within a three mile radius of site as directed by the Engineer. All other items of equipment shall be disposed of off-site by the Contractor at his expense, in accordance with applicable laws, ordinances and regulations.

3.04 STRUCTURAL REMOVALS

A. The Contractor shall remove structures to the lines and grades shown, unless otherwise indicated by the Engineer.

B. All wood, concrete, brick, tile, concrete block, roofing materials, reinforcement, structural or miscellaneous metals, plaster, wire mesh and other items contained in or upon the structure shall be removed and taken from the project site. These items shall not be used in backfill.

3.05 MECHANICAL REMOVALS

A. Mechanical removals shall consist of dismantling and removing of existing piping, equipment and other appurtenances as shown or required for the completion of the work. It shall include cutting, capping and plugging as required by the Engineer.

3.06 CLEANUP

A. The Contractor shall remove from the project site all debris resulting from the demolition and removal operations as it accumulates. Upon completion of the demolition work, all materials, equipment, waste and debris of every sort shall be removed and the premises shall be left clean, neat and orderly.

END OF SECTION

DIVISION 3

CONCRETE

SECTION 03100
CONCRETE FORMWORK

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall design and furnish all materials for concrete formwork, bracing, and supports and shall design and construct all falsework, all in accordance with the provisions of the Contract Documents.

1.02 RESPONSIBILITY

A. The design and engineering of the formwork as well as safety considerations are the responsibility of the Contractor.

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. 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.

1. Codes and Standards

a. The Building Code, as referenced herein, is the Florida Building Code (FBC).

2. Government Standards

a. PS 1 U.S. Product Standard for Concrete Forms, Class I.

3. Commercial Standards

a. ACI 347 Recommended Practice for Concrete Formwork.

b. ACI 318R Building Code Requirements for Reinforced Concrete.

1.04 QUALITY ASSURANCE

A. The variation from established grade or lines shall not exceed 1/4 inch in 10 feet and there shall be no offsets or visible bulges or waviness in the finished surface. All tolerances shall be within the "Suggested Tolerances"

specified in ACI 347. The Contractor shall grind smooth all fins and projections between formwork panels as directed by the Engineer.

B. Curved forms shall be used for curved and circular structures that are cast-in-place. Straight panels will not be acceptable for forming curved structures.

PART 2 - PRODUCTS

2.01 FORM MATERIALS

A. Except as otherwise expressly accepted by the Engineer, all lumber brought on the job site for use as forms, shoring, or bracing shall be new material. All forms shall be smooth surface forms and shall be of the following materials:

Footing sides -Construction grade Hem Fir or Douglas Fir
Walls -Steel or plywood panel
Columns -Steel, plywood or fiber glass Roof and floor
Slabs -Plywood
All other work -Steel panels, plywood or tongue and groove lumber

B. Materials for concrete forms, formwork, and falsework shall conform to the following requirements:

1. Lumber shall be Southern Pine, construction grade or better, in conformance with U.S. Product Standard PS20.

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 I for Concrete Forms, Class I, and shall be edge sealed. Thickness shall be as required to support concrete at the rate it is placed, but not less than 5/8-inch thick.

2.02 PREFABRICATED FORMS

A. 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 indicated. Metal forms shall be an acceptable type that will accomplish such results. Wood forms for surfaces to be painted shall be Medium Density Overlaid plywood, MDO Ext. Grade.

2.03 FORMWORK ACCESSORIES

A. Exterior corners in concrete members shall be provided with 3/4-inch chamfers. Re-entrant corners in concrete members shall not have fillets unless otherwise shown.

B. 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.

C. Form ties for water-retaining structures shall have integral waterstops. Removable taper ties may be used when acceptable to the Engineer. Taper ties shall not be used to cast water retaining structural walls. At other locations, a preformed neoprene or polyurethane tapered plug sized to seat at the center of the wall shall be inserted in the hole left by the removal of the taper tie.

D. 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.

PART 3 - EXECUTION

3.01 EXAMINATION

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 from the Work and replaced at the Contractor's expense. A sufficient number of forms of each kind shall be provided to permit the required rate of progress to be maintained. The design and inspection of concrete forms and falsework, shall comply with applicable local, state and Federal regulations. Plumb and string lines shall be installed before concrete placement and shall be maintained during placement. Such lines shall be used by Contractor's personnel and by the Engineer and shall be in sufficient number and properly installed. During concrete placement, the Contractor shall continually monitor plumb and string line form positions and immediately correct deficiencies.

B. Concrete forms shall conform to the shape, lines, and dimensions of members as called for on the Drawings, and shall be substantially, free from surface defects, and sufficiently tight to prevent leakage. Forms shall be properly braced or tied together to maintain their position and shape under a load of freshly-placed concrete.

C. 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. Suitable and effective means shall be provided on all forms for holding adjacent edges and ends of panels and sections tightly together and in accurate alignment so as to prevent the formation of ridges, fins, offsets, or similar surface defects in the finished concrete. Plywood, 5/8 inch and greater in thickness, may be fastened directly to studding if the studs are spaced close enough to prevent visible deflection marks in the concrete. The forms shall be tight so as to prevent the loss of water, cement and fines during placing and vibrating of the concrete. Specifically, the bottom of wall forms that rest on concrete footings or slabs shall be provided with a gasket to prevent loss of fines and paste during placement and vibration of concrete. Such gasket may be a 1 to 1-1/2-inch diameter polyethylene rod held in position to the underside of the wall form. Adequate clean-out holes shall be provided at the bottom of each lift of forms. The size, number, and location of such clean-outs shall be as acceptable to the Engineer.

D. 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. Pipe stubs and anchor bolts shall be set in the forms where required.

3.02 EARTH FORMS

A. All vertical surfaces of concrete members shall be formed, except where placement of the concrete against the ground is called for on the Drawings. Not less than 1 inch of concrete shall be added to the thickness of the concrete member as shown where concrete is permitted to be placed against trimmed ground in lieu of forms. Such permission will be granted only for members of comparatively limited height and where the character of the ground is such that it can be trimmed to the required lines and will stand securely without caving or sloughing until the concrete has been placed.

3.03 FOOTINGS, SLAB EDGES AND GRADE BEAMS

A. Provide wood side forms for all footings, slab edges and grade beams.

3.04 APPLICATION - FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.

3.05 INSERTS, EMBEDDED PARTS AND OPENINGS

A. Embedded Form Ties: Holes left by the removal of form tie cones shall be reamed with suitable toothed reamers so as to leave the surface of the holes clean and rough before being filled with mortar as specified for in Section 03350 entitled "Concrete Finishes". 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 spalling 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.

3.06 FORM CLEANING

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. Unused tie rod holes in forms shall be covered with metal caps or shall be filled by other methods acceptable to the Engineer.

3.07 FORMWORK TOLERANCES

A. Formwork shall be constructed to insure that finished concrete surfaces will be in accordance with the tolerances listed in ACI 347.

1. The following construction tolerances are hereby established and apply to finished walls and slab unless otherwise shown in the Drawings:

Item	Tolerance
Variation of the constructed Variation of the constructed linear outline from the established position in plan	In 10 feet: 1/4 inch; In 20 feet or more: 1/2 inch
Variation from the level or from the grades shown on the Drawings	In 10 feet: 1/4 inch; In 20 feet or more: 1/2 inch
Variation from the plum	In 10 feet: 1/4 inch; In 20 feet or more: 1/2 inch
Variation in the thickness of slabs and walls	Minus 1/4 inch; Plus 1/2 inch
Variation in the locations and sizes of slab and wall openings	Plus or minus 1/4 inch

3.08 FORM REMOVAL

A. Remove top forms on sloping surfaces of concrete as soon as removal operations will not allow the concrete to sag. Perform any needed repairs or treatment required on sloping surfaces at once and follow immediately with the specified curing.

B. The Contractor shall be responsible for the removal of forms and shores. Forms or shores shall not be removed before test cylinders have reached the specified minimum 28 day comprehensive strength for the class of concrete specified in Section 03300 entitled "Cast- in-Place Concrete", nor sooner than listed below:

1. Grade beam side forms .....3 days
2. Wall forms .....3 days
3. Column forms .....3 days
4. Beam and girder side forms .....3 days
5. Beam bottoms and slab forms/shores .....14 days

3.09 MAINTENANCE OF FORMS

A. Forms shall be maintained at all times in good condition, particularly as to size, shape, strength, rigidity, tightness, and smoothness of surface. Forms, when in place, shall conform to the established alignment and grades. Before concrete is placed, the forms shall be thoroughly cleaned. The form surfaces shall be treated with a nonstaining mineral oil or other lubricant acceptable to the Engineer. Any excess lubricant shall be satisfactorily removed before placing the concrete. Where field oiling of forms is required, the Contractor shall perform the oiling at least two weeks in

advance of their use. Care shall be exercised to keep oil off the surfaces of steel reinforcement and other metal items to be embedded in concrete.

END OF SECTION

SECTION 03200
CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish, fabricate and place all concrete reinforcing steel, welded wire fabric, couplers, and concrete inserts for use in reinforced concrete and shall perform all appurtenant work, including all the wires, clips, supports, chairs, spacers, and other accessories, all in accordance with the Contract Documents.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. 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.

1. Codes and Standards

a. The Building Code, as referenced herein, is the Florida Building Code (FBC).

2. Commercial Standards

ACI 315R	Details and Detailing of Concrete Reinforcement.
CRSI	Concrete Reinforcing Steel Institute Manual of Standard Practice
ACI 305R	Hot Weather Concreting
ACI 318R	Building Code Requirements for Reinforced Concrete.
ACI 350R-	Code Requirements for Environmental Engineering Concrete Structures
WRI	Manual of Standard Practice for Welded Wire Fabric.
AWS DI.4	Structural Welding Code - Reinforcing Steel.
ASTM A 185	Specification for Welded Steel Wire Fabric for Concrete Reinforcement.

ASTM A 615 Specification for Deformed and Plain Billet-Steel Bars for Concrete reinforcement.

1.03 SUBMITTALS

A. The Contractor shall furnish shop bending diagrams, placing lists, and Drawings of all reinforcing steel prior to fabrication in accordance with the requirements of the Section 01300 entitled, "Submittals."

B. Details of the concrete reinforcing steel and concrete inserts shall be submitted by the Contractor at the earliest possible date after receipt by the Contractor of the Notice to Proceed. Said details of reinforcing steel for fabrication and erection shall conform to ACI 315 and the requirements specified and shown. The shop bending diagrams shall show the actual lengths of bars, to the nearest inch measured to the intersection of the extensions (tangents for bars of circular cross section) of the outside surface. The shop Drawings shall include bar placement diagrams which clearly indicate the dimensions of each bar splice.

C. Where mechanical couplers are shown on the Drawings to be used to splice reinforcing steel, the Contractor shall submit manufacturer's literature which contains instructions and recommendations for installation for each type of coupler used; certified test reports which verify the load capacity of each type and size of coupler used; and shop Drawings which show the location of each coupler with details of how they are to be installed in the formwork.

D. If reinforcing steel is spliced by welding at any location, the Contractor shall submit mill test reports which shall contain the information necessary for the determination of the carbon equivalent as specified in AWS DI.4. The Contractor shall submit a written welding procedure for each type of weld for each size of bar which is to be spliced by welding, merely a statement that AWS procedures will be followed is not acceptable. Welding of rebar shall be done only where shown on the Drawings or allowed in writing by the Engineer.

PART 2 - PRODUCTS

2.01 REINFORCEMENT

A. 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 with supplementary requirement S-1, and shall be manufactured in the United States.

2. Welded wire fabric reinforcement shall conform to the requirements of ASTM A 185 and the details shown on the Drawings; provided, that welded wire fabric shall be furnished in flat sheets only. All welded wire fabric reinforcement shall be galvanized.

2.02 ACCESSORY MATERIALS

A. Bolsters, chairs, spacers and other devices for supporting and fastening reinforcing in place shall be galvanized wire type complying with CRSI recommendations on grade with gray plastic tipped legs.

B. Tie Wire: Galvanized 16 gauge annealed type.

C. Concrete blocks (dobies), used to support and position reinforcing steel, shall have the same or higher compressive strength as specified for the concrete in which it is located. Concrete blocks shall only be used bottom mat of reinforcing steel for slabs on grade.

D. Couplers used to mechanically splice reinforcing steel shall be Linton Standard Copier - A2 manufactured by ERICO Products, inc. or equal. Bars shall be shop threaded to receive couplers.

2.03 FABRICATION

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, ACI 318, and ACI 350 except as modified by the Drawings. Stirrups and tie bars shall be bent around a pin having a diameter not less than 1-1/2 inch for No.3 bars, 2-inch for No.4 bars, and 2-1/2 inch for No.5 bars. Bends for other bars shall be made around a pin having a diameter not less than 6 times the minimum thickness, except for bars larger than 1 inch, in which case the bends shall be made around a pin of 8 bar diameters. Bars shall be bent cold.

B. The Contractor shall fabricate reinforcing bars for structures in accordance with bending diagrams, placing lists, and placing Drawings. Said Drawings, diagrams, and lists shall be prepared by the Contractor as specified under Section entitled "Submittals," herein.

C. Fabricating Tolerances: Bars used for concrete reinforcing shall meet the following requirements for fabricating tolerances:

1. Sheared length: + 1 inch

2. Depth of bars: + 0, - 1/2 inch

3. Stirrups and ties: + 1/2 inch

4. All other bends: + 1 inch

PART 3 - EXECUTION

3.01 PLACEMENT

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. Tie wires shall be bent away from the forms in order to provide the specified concrete coverage.

C. Bars additional to those shown on the Drawings 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.

D. Unless otherwise specified, reinforcement placing tolerances shall be within the limits specified in Section 7.5 of ACI 318 except where in conflict with the requirements of the Building Code.

E. Bars may be moved as necessary to avoid interference with other reinforcing steel, conduits, or embedded items. If bars are moved more than one bar diameter, or enough to exceed the above tolerances, the resulting arrangement of bars shall be as acceptable to 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 in Paragraph B 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 on the Drawings.

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.

H. The clear distance between parallel bars (except in columns and between multiple layers of bars in beams) shall be not less than the nominal diameter of the bars nor less than 1-1/3 times the maximum size of the coarse aggregate, nor less than one inch.

I. Where reinforcement in beams or girders is placed in 2 or more layers, the clear distance between layers shall be not less than one inch.

J. In columns, the clear distance between longitudinal bars shall be not less than 1-1/2 times the bar diameter, nor less than 1-1/2 times the maximum size of the coarse aggregate, nor less than 1-1/2 inches.

K. The clear distance between bars shall also apply to the distance between a contact splice and adjacent splices or bars.

L. Reinforcing bar splices shall only be used at locations shown on the Drawings. When it is necessary to splice reinforcement at points other than where shown, the character of the splice shall be as acceptable to the Engineer.

M. The length of lap for reinforcing bars, unless otherwise shown on the Drawings shall be in accordance with AC1318, Section 12.15.1 for a class B splice.

N. Laps of welded wire fabric shall be in accordance with the ACI 318. Adjoining sheets shall be securely tied together with No. 14 tie wire, one tie for each 2 running feet. Wires shall be staggered and tied in such a manner that they cannot slip.

O. Reinforcing shall not be straightened or rebent in a manner which will injure the material. Bars with kinks or bends not shown on the Drawings 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 on the Drawings or specifically permitted by the Engineer.

3.02 CLEANING AND PROTECTION

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 delay in depositing concrete, reinforcing shall be reinspected and, if necessary recleaned.

END OF SECTION

SECTION 03300
CAST -IN-PLACE CONCRETE

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, all in accordance with the requirements of the Contract Documents.

B. The requirements in this section shall apply to the following types of concrete:

1. Class A Concrete: Normal weight concrete used at all locations, unless otherwise noted.

2. Class B Concrete: Normal weight concrete with pea-rock aggregate. Class B concrete shall be used only at locations indicated on the Drawings.

3. Class C Concrete: Normal weight concrete used in electrical/ instrumentation ductbanks, pipe encasements and sidewalks.

4. Tremie concrete: Concrete indicated to be placed underwater.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. 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 (FBC) 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. Codes and Standards

1. The Building Code, as referenced herein, shall be the Florida Building Code.

C. Federal Specifications

1. UU-B-790A (Int. Amd. 1) Building Paper, Vegetable Fiber (Kraft, Waterproofed, Water Repellant and Fire Resistant).

D. Commercial Standards

ACI 214.1 R-81	Recommended Practice for Evaluation of Strength Test Results of Concrete.
AC1318R	Building Code Requirements for Reinforced Concrete.
ACI 301	Specifications for Structural Concrete for Buildings.
ACI 315R	Details and Detailing of Concrete Reinforcement.
ACI 347R	Recommended Practice for Concrete Formwork.
ASTM C 31	Methods of 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 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 C 156	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 260	Specification for Air-Entraining Admixtures for Concrete.
ASTM C 494	Specification for Chemical Admixtures for Concrete.

1.03 SUBMITTALS

A. The design mix 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 that 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 relative to strength and slump. 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.

B. Where ready-mix concrete is used, the Contractor shall provide delivery tickets at the time of delivery of each load of concrete. In addition to the information required by ASTM C94, each ticket shall show the mix number, cement content and water/cement ratio.

C. Location of all proposed construction joints.

D. Manufacturer's data on all admixtures.

E. Concrete mix designs for each type of mix proposed and its intended locations.

F. A schedule of all concrete placement with volume of concrete planned to be placed each day.

G. A layout of all structures with all planned construction joint locations.

1.04 QUALITY ASSURANCE

A. Plant equipment and facilities shall meet all requirements of the Check List for Certification of Ready Mixed Concrete Production facilities of the National Ready Mixed Concrete Association and ASTM C 94.

B. Tests for compressive strength and slump of concrete will be performed as specified herein. Test for determining slump will be in accordance with the requirements of ASTM C 143.

C. The cost of all tests, 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 assistance to the Engineer in obtaining samples. The Contractor shall dispose of and clean up all excess material.

E. Construction Tolerances

1. 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 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 and Section 03100 entitled "Concrete Formwork".

1.05 FIELD SAMPLES

A. Field Compression Tests

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 50 yards of concrete placed. Each set of test specimens shall be a minimum of 5 cylinders.

2. Compression test specimens for concrete shall be made in accordance with ASTM C 31. Specimens shall be 6-inch diameter by 12-inch high cylinders.

3. Compression test shall be performed in accordance with ASTM C 39. One cylinder tested at three days, one test cylinders will be tested at 7 days and 2 at 28 days. The remaining cylinder 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 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.

PART 2 - PRODUCTS

2.01 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 and stored for the work shall comply with the requirements of ACI 301, as applicable.

C. Materials for concrete shall conform to the following requirements:

1. Cement shall be standard brand portland cement conforming to ASTM C 150 for Type II. Portland cement shall contain not more than 0.60 percent alkalies. The term "alkalies" referred to herein is defined as the sum of the percentage of sodium oxide and 0.658 times the percentage of potassium oxide (Na20 + 0.658 K2O). These oxides shall be determined in accordance with ASTM C 114. 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 so 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 if requested regarding 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.

3. Aggregates shall be obtained from pits acceptable to the Engineer, shall be non-reactive, and shall conform to the Florida Building Code (FBC) and ASTM C 33. Maximum size of coarse aggregate shall be as specified in Article 2.04, Paragraph B of this Section. Lightweight sand for fine aggregate will not be permitted.

a. Coarse aggregates shall consist of clean, hard, durable gravel, crushed gravel, crushed rock or a combination thereof. The coarse aggregates shall be prepared and handled in two or more size groups for combined aggregates with a maximum size not greater than 1 inch. When the aggregates are proportioned for each batch of concrete the two size groups shall be combined.

b. Fine aggregates shall be manufactured sand that is hard and durable.

c. Combined aggregates shall be well graded from coarse to fine sizes, and shall be uniformly graded between screen sizes to produce a concrete that has optimum workability and consolidation characteristics. Where a trial batch is required for a mix design, the final combined aggregate gradations will be established during the trial batch process.

d. When tested in accordance with "Potential Reactivity of Aggregates (Chemical Method)" (ASTM C 289), the ratio of silica released to reduction in alkalinity shall not exceed 1.0.

e. When tested in accordance with "Organic Impurities in Sands for Concrete" (ASTM C 40), the fine aggregate shall produce a color in the supernatant liquid no darker than the reference standard color solution.

f. When tested in accordance with "Resistance to Abrasion of Small size Coarse Aggregate by Use of the Los Angeles Machine" (ASTM C 131), the coarse aggregate shall show a loss not exceeding 42 percent after 500 revolutions, or 10.5 percent after 100 revolutions.

g. When tested in accordance with "Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate" (ASTM C 88), the loss resulting after five cycles shall not exceed 10 percent for fine or coarse aggregate when using sodium sulfate.

4. All cement, admixtures, sealers, and form release agents used in or on the concrete or mortar shall conform to NSF International (NSF) standard 61-2001 and Addendum 1.0-2001 to NSF Standard 61-2001.

5. Aggregate used in the concrete or mortar shall be clean (i.e. free of excess clay, silt, mica, organic matter, chemical salts and coated grains) and shall be essentially free of those metals and radionuclides regulated under applicable primary drinking water standards.

2.02 ADMIXTURES

A. 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.

B. 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 the Contractor's expense. The use of an admixture shall be subject to acceptance by the Engineer. Concrete containing an admixture shall be first placed at a location determined by the Engineer. If the use of an admixture is producing an inferior end result, the Contractor shall discontinue use of the admixture. Admixtures specified herein shall conform to the requirements of ASTM C 494. The required quantity of cement shall be used in the mix regardless of whether or not an admixture is used. 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.

1. Set controlling admixture shall be either with or without water-reducing properties. Where the air temperature at the time of placement is expected to be consistently over 80 degrees Fahrenheit, a set retarding admixture such as Sika Chemical Corporation's Plastiment, Master Builder's Pozzolith 200R or equal shall be used. Where the air temperature at the time of placement is expected to be consistently under 40 degrees Fahrenheit, a set accelerating admixture such as Sika Chemical Corporation's Plastocrete 161 FL, Master Builder's Pozzolith 50C, or equal shall be used.

2. Low range water reducer shall be added to all structural concrete, and shall conform to ASTM C 494, Type A. It shall be either a hydroxylated carboxylic acid type or a dydroxylated polymer type. The quantity of admixture used and the method of mixing shall be in accordance with the manufacturer's instructions and recommendations.

3. Water reducing and retarding admixture shall be in conformance with ASTM C 494 Type D free of chlorides, "MB-HC" by Master Builders, "WRDA-79" by Grace or equal.

4. High range water reducer shall be sulfonated polymer conforming to ASTM C 494, Type For G.

5. If the high range water reducing agent is added to the concrete at the batch plant, it shall be second generation type, Daracem 100, as manufactured by W.R. Grace & Co., Pozzolity 430R, as

manufactured by Master Builders; or equal. High range water reducer shall be added to the concrete after all other ingredients have been mixed and initial slump has been verified.

6. If the high range water reducer is added to the concrete at the job site, it shall be used in conjunction with a low range water reducer and shall be Pozzolith 400N and Pozzolith MBL82, as manufactured by Master Builders; WRDA 19 and WRDA 79, as manufactured by W.R. Grace & Co., or equal. Concrete shall have a slump of 3 inches.± 1/2 inch prior to adding the high range water reducing admixture at the job site. The high range water reducing admixture shall be accurately measured and pressure injected into the mixer as a single dose by an experienced technician. A standby system shall be provided and tested prior to each day's operation of the job site system.

7. Concrete shall be mixed at mixing speed for a minimum of 30 mixer revolutions after the addition of the high range water reducer.

8. The Contractor shall submit certification from each admixture manufacturer that all admixtures utilized in the design mix are compatible with one another and properly proportioned.

9. Prohibited Admixtures: Calcium chloride, thiocyanate or admixtures containing more than 0.05 percent chloride ions are not permitted.

10. Certification: 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.

11. For Class A, Class B and Class C Concrete, no flyash may be added.

2.03 ACCESSORIES

A. Epoxy adhesives shall be the following products for the applications specified to be used in strict accordance with manufacturer's recommendations.

1. For bonding freshly-mixed, plastic concrete to hardened concrete, Sikadur 32 Hi-Mod, LPL Epoxy Adhesive, as manufactured by Sika Chemical Corporation; Concresive 1001-LPL, as manufactured by Adhesive Engineering Company; or equal.

2. For bonding hardened concrete or masonry to steel, Colma-Our Gel, Sikadur Hi-Mod Gel, or equal.

3. Epoxy grouting of vertical and horizontal dowels in existing concrete: A two-component structural epoxy gel such as Rawl/Sika Foil-Fast Epoxy Injection Gel, Sikadur injection gel as manufactured by Sika Chemical Corp., EPCON G5, EPCON C6 or approved equal. Place with pneumatic or manual injection gun.

2.04 CONCRETE MIX

A. 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 by the Contractor. 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. Mix designs with more than 41 percent of sand of the total weight of fine and coarse aggregate shall not be used for Class A Concrete. 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. The proportions of cement, aggregates, admixtures and water used in the concrete shall be based on tests of grading and moisture content of materials, slump of concrete mixture, strength of concrete and the following factors:

1. Class A Concrete (All cast-in-place and precast concrete unless otherwise noted).

Minimum cementitous materials content, per cubic yard	without flyash added: 611 lbs.
Maximum water-cementitous materials ratio, by weight	0.45
Slump range	3 inches to 4 inches with water reducing admixture 3-inch maximum before addition of high range water reducing admixture. 8-inch maximum after addition of high range water reducing admixture
Coarse Aggregate	#57 per ASTM C33
Compressive strength at 28 days -	4,000 psi

F'c	
Air Content	3% ± 1 %

2. Class B Concrete (At locations shown on the Drawings or specified herein).

Minimum cementitous materials content, per cubic yard	517 lbs.
Maximum water-cementitous materials ratio, by weight	0.50
Slump, maximum	5 inches
Compressive strength at 28 days - F'c	3,000 psi
Coarse Aggregate	Pearock
Air Content	3% ± 1%

3. Class C Concrete (Sidewalks)

Minimum cementitous materials content, per cubic yard	500 lbs.
Maximum water-cementitous materials ratio, by weight	0.55
Slump, maximum	5 inches
Compressive strength at 28 days - F'c	3,000 psi
Compressive strength at 28 days – F'c (Sidewalk only)	2,500 psi
Coarse Aggregate	#57 per ASTM C33
Air Content	2 ½ % ± 5 ½ %

C. All Class A concrete, unless noted otherwise on the Drawings, shall be air entrained concrete and contain the high range water-reducing admixture (superplasticizer). A water reducing admixture may be added to the mix at the Contractor's option.

D. The mix proportions used shall be changed subject to the limitation specified herein, 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.

2.05 CONSISTENCY

A. The quantity of water entering into a batch of concrete shall be just sufficient, with a normal mixing period, to produce a concrete which can be worked properly into place without segregation, and which can be compacted by the vibratory methods herein specified to give the desired density, impermeability and smoothness of surface. The quantity of water shall be changed as necessary, with variations in the nature or moisture content of the aggregates, to maintain uniform production of a desired consistency. 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 inch measured at the form. Slump with high range water reducers shall be 6 inches ± 1 inch at the form.

2.06 READY-MIXED CONCRETE

A. Ready-mixed concrete shall be used meeting the requirements as 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. Upon delivery from the truck concrete temperature shall not exceed 90 degrees Fahrenheit.

C. Truck mixers shall be equipped with electrically-actuated counters by which the number of revolutions of the drum or blades may be readily verified. The counter shall be of the resettable, recording type. The counters shall be actuated at the time of starting mixers at mixing speeds.

D. Each batch of concrete shall be mixed in a truck mixer for not less than 70 revolutions of the drum or blades at the rate of rotation designated by the manufacturer of equipment. Additional mixing, if any, shall be at the speed designated by the manufacturer of the equipment as agitating speed. All materials including mixing water shall be in the mixer drum before actuating the revolution counter for determining the number of revolution of mixing.

PART 3 - EXECUTION

3.01 PROPORTIONING AND MIXING

A. Proportioning of the concrete mix shall conform to the requirements of Chapter 3 "Proportioning" of ACI 301; provided, that the maximum slump

for any concrete shall not exceed the limits specified in this Section of the Specifications.

B. Mixing of concrete shall conform to the requirements of Chapter 7 of ACI 301 Specifications.

C. Retempering of concrete or mortar which has partially hardened will not be permitted.

3.02 PREPARATION

A. 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. A vapor barrier specified in Section 07190 entitled "Vapor Barrier" shall be placed. The surface shall be free from standing water, mud, and debris at the time of placing concrete.

B. 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 one day for review and any corrective measures which are required.

C. Joints in Concrete

1. Concrete surfaces upon or against which concrete is to be placed shall be given a roughened surface for good bond and a bonding agent shall be placed.

2. After the surfaces have been prepared all approximately horizontal construction joints shall be covered with a layer of mortar approximately one-inch thick. The mortar shall have the same proportions of cement and sand as the regular concrete mixture. The water-cement ratio of the mortar in place shall not exceed that of the concrete to be placed upon it, and the consistency of the mortar shall be suitable for placing and working in the manner hereinafter specified. The mortar shall be spread uniformly and shall be worked thoroughly into all irregularities of the surface. Wire brooms shall be used where possible to scrub the mortar into the surface. Concrete shall be placed immediately upon the fresh mortar.

D. Placing Interruptions

1. 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. Cold joints will be sufficient cause for rejection of the work.

E. Embedded Items

1. No concrete shall be placed until all formwork, installation of parts to be embedded, reinforcing steel, and preparation of surfaces involved in the placing have been completed and accepted by the Engineer at least four 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.

2. All inserts or other embedded items shall conform to the requirements herein.

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. All anchor bolts called for on the drawings shall be cast-in-place in the concrete. Drilled, impact, adhesive or other types of anchors shall not be substituted for anchor bolts unless otherwise shown on the Drawings. Anchor bolts shall conform to the requirements set forth in Section 05500 entitled "Miscellaneous Fabrications."

H. Casting New Concrete Against Old

1. 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 sand-blasting (exposing aggregate) to an amplitude of ¼” prior to the application of an epoxy bonding agent.

I. 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 underwater, except where shown on the Drawings to be placed by the tremie method, 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.

J. Corrosion Protection

1. 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. Securing such items in position by wiring or welding them to the reinforcement will not be permitted.

2. 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.

3. Anchor bolts shall be accurately set, and shall be maintained in position by templates while being embedded in concrete.

4. 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.

3.03 PLACING CONCRETE

A. Placing of concrete shall conform to the applicable requirements of Chapter 8 of ACI 301 and the requirements of this Section.

B. Non-Conforming Work or Materials

1. 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.

C. Unauthorized Placement

1. No concrete shall be placed except in the presence of duly authorized representative of the Engineer. The Contractor shall notify the Engineer at least 24 hours in advance of placement of any concrete.

D. Placement in Wall Forms

1. Concrete shall not be dropped through reinforcement steel or into any deep form, whether reinforcement is present or not, causing separation of the coarse aggregate from the mortar on account of repeatedly hitting rods or the sides of the form as it falls, nor shall concrete be placed in any form in such a manner as to leave

accumulation of mortar on the form surfaces above the placed concrete. In such cases, some means such as the use of hoppers and, if necessary, vertical ducts of canvas, rubber, or metal shall be used for placing concrete in the forms in a manner that it may reach the place of final deposit without separation. In no case shall the free fall of concrete exceed 4 feet below the ends of ducts, chutes, or buggies.

2. Concrete shall be uniformly distributed during the process of depositing and in no case after depositing shall any portion be displaced in the forms more than 6 feet in horizontal direction. Concrete in forms shall be deposited in uniform horizontal layers not deeper than 2 feet; and care shall be taken to avoid inclined layers or inclined construction joints except where such are required for sloping members. Each layer shall be placed while the previous layer is still soft. The rate of placing concrete in forms shall not exceed 5 feet of vertical rise per hour.

E. Casting New Concrete Against Old

1. An epoxy adhesive bonding agent shall be applied to set surfaces of construction joints according to the manufacturer's written recommendations.

F. Conveyor Belts and Chutes

1. All ends of chutes, hopper gates, and all other points of concrete discharge throughout the Contractor's conveying, hoisting and placing system shall be so designed and arranged that concrete passing from them will not fall separated into whatever receptacle immediately receives it. Conveyor belts, if used, shall be of a type acceptable to the Engineer. Chutes longer than 50 feet will not be permitted. Minimum slopes of chutes shall be such that concrete of the specified consistency will readily flow in them. If a conveyor belt is used, it shall be wiped clean by a device operated in such a manner that none of the mortar adhering to the belt will be wasted. All conveyor belts and chutes shall be covered. Sufficient illumination shall be provided in the interior of all forms so that the concrete at the places of deposit is visible from the deck or runway.

G. Placement in Slabs

1. Concrete placed in sloping slabs shall proceed uniformly from the bottom of the slab to the top, for the full width of the pour. As the work progresses, the concrete shall be vibrated and carefully worked around the slab reinforcement, and the surface of the slab shall be screeded in an up-slope direction.

H. Temperature of Concrete

1. The temperature of concrete when it is being placed shall be not more than 90 degrees F. Concrete ingredients shall not be heated to a temperature higher than that necessary 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 Fahrenheit, 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. During summer months concrete pours shall be scheduled in the morning or early part of the day when temperatures are cooler.

I. Pumping Equipment

1. Pumping equipment and procedures if used shall conform to the recommendations contained in the report of ACI Committee 304 on Placing Concrete by Pumping Methods, ACI 304.2R. The specified slump shall be measured at the point of discharge. The loss of slump in pumping shall not exceed 1-1/2 inches.

J. The order of placing concrete in all parts of the work shall be acceptable to the Engineer. In order to minimize the effects of shrinkage, the concrete shall be placed in units as bounded by construction joints shown on the Drawings. The placing of units shall be done by placing alternate units in a manner such that each unit placed shall have cured at least 7 days before the contiguous unit or units are placed, except that the corner sections of vertical walls shall not be placed until the 2 adjacent wall panels have cured at least 14 days.

K. The surface of the concrete shall be level whenever a run of concrete is stopped. To insure a level, straight joint on the exposed surface of walls, a wood strip at least 3/4-inch thick shall be tacked to the forms on these surfaces. The concrete shall be carried about 1/2-inch above the underside of the strip. About one hour after the concrete is placed, the strip shall be removed and any irregularities in the edge formed by the strip shall be leveled with a trowel and ailiaitance shall be removed.

L. 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 corners 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 (8000 to 10,000 rpm) of an immersion type in sufficient number and with (at least one) standby units as required.

M. Care shall be used in placing concrete around waterstops. The concrete shall be carefully worked by rodding and vibrating to make sure that all air and rock pockets have been eliminated. Where flat-strip type waterstops are placed horizontally, the concrete shall be worked under the waterstops by hand, making sure that all air and rock pockets have been eliminated. Concrete surrounding the waterstops shall be given additional vibration, over and above that used for adjacent concrete placement to assure complete embedment of the waterstops in the concrete.

N. Concrete in walls shall be internally vibrated and at the same time, 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 within 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.

3.04 CONCRETE FINISHING

A. Concrete finishes are specified in Section 03350 entitled "Concrete Finishes".

3.05 CURING AND PROTECTION

A. Curing is specified in Section 03370 entitled "Concrete Curing".

3.06 PLACING CONCRETE UNDER PRESSURE (PUMPING)

A. Where concrete is conveyed and placed by mechanically applied pressure, the equipment shall have the capacity for the operation. The operation of the pump shall be such that a continuous stream of concrete without air pockets is produced. To obtain the least line resistance, the layout of the pipeline system shall contain a minimum number of bends with no change in pipe size. If two sizes of pipe must be used, the smaller diameter should be used at the pump end and the larger at the discharge end. When pumping is completed, the concrete remaining in the pipelines, if it is to be used, shall be ejected in such a manner that there will be no contamination of the concrete or separation of the ingredients.

B. No aluminum parts shall be in contact with the concrete during the entire placing of concrete under pressure at any time.

C. Prior to placing concrete under pressure, the Contractor shall submit the concrete mix design together with test results from a recognized testing laboratory proving the proposed mix meets all requirements. In addition, at the Contractor's option, an actual pumping test under field conditions may be performed prior to use of the accepted mix. This test requires a duplication of anticipated site conditions from beginning to end. The batching and truck mixing shall be the same as will be used; the same pump and operator shall be present and the pipe and pipe layouts will reflect the maximum height and distance contemplated.

D. 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.

E. The pumping equipment must have two cylinders and be designed to operate with one cylinder only in case the other one is not functioning. In lieu of this requirement, the Contractor may have a standby pump on the site during pumping.

F. The minimum diameter of the hose (conduits) shall be four inches.

G. Pumping equipment and hoses (conduits) that are not functioning properly shall be replaced.

3.07 ORDER OF PLACING CONCRETE

A. In order to minimize the effects of shrinkage, the concrete shall be placed in units as bounded by construction joints shown on the Drawings and maximum lengths as indicated on Drawings. The placing of units shall be done by placing alternate units in a manner such that each unit placed shall be have cured at least seven days before the contiguous unit or units are placed, except that the corner sections of vertical walls shall not be placed until the two adjacent wall panels have cured at least 14 days.

B. The surface of the concrete shall be level whenever a run of concrete is stopped.

3.08 DEFECTIVE CONCRETE

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 be smoothed will not be

permitted. No repairs shall be made until reviewed 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 as specified in Article 3.06, Paragraph A of this Section, 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. The material used for repair proposed shall consist of a mixture of one sack of cement to 3 cubic feet of sand. For exposed walls, the cement shall contain such a proportion of Atlas white portland cement as is required to make the color of the patch match the color of the surrounding concrete.

C. Holes left by tie-rod cones shall be repaired in an acceptable manner with dry-packed cement grout or premixed patching material as accepted by the Engineer.

D. All repairs shall be built up and shaped in such a manner that the completed work will conform to the requirements of Article 3.04 or 3.06 of this Section, as applicable, using acceptable 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.

E. Prior to backfilling, all cracks that may have developed shall be "vee'd" and filled with sealant conforming to the requirements of Section 03290 entitled, " Joints in Concrete". This repair method shall be done on the faces of members in contact with fill.

3.09 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.

3.10 CONCRETE SEALER

A. Contractor shall apply to the top surface of all finished concrete floor slabs and equipment pads a sealer specified in Section 09850 entitled "Painting".

END OF SECTION

SECTION 03315
GROUT

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish all materials for grout 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 grout, all in accordance with the requirements of the Contract Documents.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Specifications, codes, and standards shall be as specified in Section 03300 entitled "Cast-in-Place Concrete," and as referred to herein.

B. Additional Commercial Standards

CRD-C 621 Corps of Engineers Specification for Nonshrink Grout

1.03 SUBMITTALS

A. The Contractor shall submit 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.

PART 2 - PRODUCTS

2.01 PREPACKAGED NON-SHRINK CEMENTITIOUS GROUT

A. Nonshrink 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.

B. Nonshrink 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.

C. Cement based grout shall be Five Star Grout as manufactured by Five Star Products, Inc., Fairfield, Connecticut, or equal.

D. 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.

2.02 PREPACKAGED NON-SHRINK EPOXY GROUT

A. 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.

B. 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.

C. 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.

D. Non-shrink epoxy grout shall be Five Star DP Epoxy Grout by Five Star Products, Inc., Fairfield, Connecticut, or equal.

2.03 CEMENT GROUT

A. Cement grout for fills in the bottom of the clarifiers and other structures shall conform to the requirements specified herein for Class B concrete, except the coarse aggregate shall have 100 percent passing the 1/2-inch sieve and 85 percent passing the 3/8-inch sieves. The grout shall be placed within the tolerances shown on the Drawings for the clearance between the mechanical equipment arms. The mechanical equipment arms of the tanks shall not be operated as a primary screed for moving grout, but may be used in the final screeding operation provided the Contractor assumes full responsibility for any damage to the equipment. Final coating of the clarifier equipment shall occur only after the grout is placed, consolidated, and cured.

2.04 DOWEL/ANCHOR BOLT ADHESIVE SYSTEM

A. When rebar or anchor bolts are specified to be drilled in and grouted on the Drawings, an adhesive system specified in Section 03300 entitled "Cast-in-Place Concrete" shall be used.

2.05 CURING MATERIALS

A. Curing materials shall be as recommended by the manufacturer.

2.06 CONSISTENCY

A. The consistency of grouts shall be that necessary to completely fill the space to be grouted for the particular application. Dry pack consistency is such that the grout is plastic and moldable but will not flow. Where "dry pack" is called for in the Contract Documents, it shall mean a grout of the above described consistency; the type of grout to be used shall be as specified herein for the particular application.

2.07 MEASUREMENT OF INGREDIENTS

A. Prepackaged grouts shall have ingredients measured by means recommended by the manufacturer.

PART 3 - EXECUTION

3.01 GENERAL

A. All surface preparation, curing, and protection of cement grout shall be as specified in Section 03300 entitled "Cast-in-Place Concrete." The finish of the grout surface shall match that of the adjacent concrete.

B. 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.

3.02 CONSOLIDATION

A. 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 03350
CONCRETE FINISHES

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish all materials, labor, and equipment required to provide finishes of all concrete surfaces specified herein and shown on the Drawings.

1.02 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. ACI 301 -Specifications for Structural Concrete for Buildings

2. ACI 318 - Building Code Requirements for Reinforced Concrete

1.03 SUBMITTALS

A. Submit the following in accordance with Section 01300 entitled "Submittals".

1. Manufacturer's literature on all products specified herein.

PART 2 - PRODUCTS

2.01 CONCRETE FLOOR SEALER

A. Floor sealer is specified in Section 03350-3.03.

PART 3 - EXECUTION

3.01 FINISHES ON FORMED CONCRETE SURFACES

A. After removal of forms, the finishes described below shall be applied in accordance with Article 3.05 of this Section entitled "Concrete Finish

Schedule". 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.

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, a 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 require 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.

3.02 SLAB AND FLOOR FINISHES

A. The finishes described below shall be applied to floors, slabs, flow channels and top of walls in accordance with Article 3.05 of this Section entitled "Concrete Finish Schedule". The Engineer shall be the sole judge of acceptability of all such finish work.

1. Type "A" - Screeded: This finish shall be obtained by placing screeds at frequent intervals and striking off to the surface elevation required. When a Type "F" finish is subsequently to be

applied, the surface of the screeded concrete shall be roughened with a stiff brush or rake prior to final set.

2. Type "B" - Wood Floated: This finish shall be obtained after completion of a Type "A" finish by working a previously screeded surface with a wood float until the desired texture is reached. Floating shall begin when the water sheen has disappeared and when the concrete has sufficiently hardened so that a person's foot leaves only a slight imprint. If wet spots occur, water shall be removed with a squeegee. Care shall be taken to prevent the formation of laitance and excess water on the finished surface. The finished surface shall be true, even, and free from blemishes and other irregularities.

3. Type "C" - Cork Floated: This finish shall be similar to Type "B" but slightly smoother than that obtained with a wood float. It shall be obtained by power or band floating with cork floats.

4. Type "D" - Steel Toweled: This finish shall be obtained after completion of a Type "B" finish. When the concrete has hardened sufficiently to prevent excess fine material from working to the surface, the surface shall be compacted and smoothed with not less than two thorough and complete steel toweling operations. In areas which are to receive a floor covering such as tile, resilient flooring, or carpeting, only one toweling operation is required. The finish shall be brought to a smooth, dense surface, free from defects and blemishes.

5. Type "E" - Broom or Belt: This finish shall provide the surface with a transverse scored texture by drawing a broom or burlap belt across the surface immediately after completion of a Type "B" finish.

6. Type "F" - Swept in Grout Topping: This finish shall be applied after a completion of a Type "A" finish. The concrete surface shall be properly cleaned, washed, and coated with a mixture of water and Portland Cement. Cement grout in accordance with Section 03315 shall then be plowed and swept into neat conformance with the blades or arms of the apparatus by turning or rotating the previously positioned mechanical equipment. Special attention shall be paid to true grades, shapes and tolerances as specified by the manufacturer of the equipment. Before beginning this finish, the Contractor shall notify the Engineer and the equipment manufacturer of the details of the operation and obtain approval and recommendations.

7. Type "G" - Hardened Finish: Either a liquid hardened finish or an aggregate hardened finish shall be provided at the Contractor's option.

a. Liquid hardened finish shall be provided by application of a liquid floor hardener. Floors to receive this finish shall have previously received a Type "D" finish. Liquid hardener shall be applied between 30 to 60 days after concrete placement. Surface to be treated shall be dry, clean and free of all loose dust, dirt, oil, wax, sealers and curing compounds. Application procedure shall be in accordance with manufacturer's instructions and shall consist of a three-coat treatment.

b. Aggregate hardened finish shall be provided by applying an aggregate floor hardener concurrently with the application of a Type "D" finish. Application procedure shall be in accordance with manufacturer's instructions.

8. Type "H" - Non-Slip Finish: This finish shall be provided by applying a non-slip shake-on aggregate concurrently with the application of a Type "D" finish. Application procedure shall be in accordance with manufacturer's instructions.

9. Type "J" - Raked Finish: This finish shall be provided by raking the surface as soon as the condition of the concrete permits by making depressions of +/-1/4 inch.

3.03 SEALING OF CONCRETE FLOOR

A. After installation of all equipment and piping, and after completion of other related construction activities, all floor slabs which are to remain unpainted and not intended to be immersed shall be sealed with a “Sikagard 701W” floor sealer unless stated otherwise. Remove all dirt, droppage, oil, grease, asphalt or other foreign matter with caustics and detergents as required prior to application. Sealer shall be applied in accordance with the manufacturer's recommendations.

3.04 FINISHES ON EQUIPMENT PADS

A. Formed surfaces of equipment pads shall receive a Type I finish.

B. Top surfaces of equipment pads, except those surfaces subsequently required to receive non-shrink grout and support equipment bases, shall receive a Type "0" finish, unless otherwise noted. Surfaces which will later receive non-shrink grout shall, before the concrete takes its final set, be made rough by removing the sand and cement that accumulates on the top to the extent that the aggregate will be exposed with irregular indentations in the surface up to 1/2 inch deep.

3.05 CONCRETE FINISH SCHEDULE

Item	Type of Finish
Exterior concrete walls below grade	I
Exterior exposed concrete walls and columns (including top of wall) to one foot below grade. All other exposed concrete surfaces not specified elsewhere	II
All interior exposed concrete vertical surfaces in buildings	III
Interior exposed ceiling, including beams	III
Floors of process equipment tanks or basins, and slabs to receive roofing material or waterproof membranes	B
All interior finish floors of buildings and structures and walking surfaces which will be continuously or intermittently wet	C
All interior finish floors of buildings and structures which are not continuously or intermittently wet	D
Floors to receive tile, resilient flooring, or carpeting	D
Concrete in flow channels	D
Exterior concrete sidewalks, steps, ramps and landings	E
Garage and storage area floors	G
Precast concrete form panels, hollow core planks, double tees	J

*Finish shall be acceptable to the coating applicator and manufacturer. See Section 09912 entitled "Painting".

END OF SECTION

SECTION 03370
CONCRETE CURING

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall protect all freshly deposited concrete from premature drying and from the weather elements. The concrete shall be maintained with minimal moisture loss at a relatively constant temperature for a period of time necessary for the hydration of the cement and proper hardening of the concrete in accordance with the requirements specified herein.

1.02 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.

ACI 301	Specifications for Structural Concrete for Buildings
ACI 304	Guide for Measuring, Mixing, Transporting, and Placing Concrete
ACI 305	Hot Weather Concreting
ACI 306	Cold Weather Concreting
ACI 308	Standard Practice for Curing Concrete
ASTM C171	Standard Specifications for Sheet Materials for Curing Concrete
ASTM C309	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
Federal Specification TT -C-800	

1.03 SUBMITTALS

A. Submit the following in accordance with Section 01300 entitled "Submittals".

1. Proposed procedures for protection of concrete under wet weather placement conditions.

2. Proposed normal procedures for protection and curing of concrete.

3. Proposed special procedures for protection and curing of concrete under hot and cold weather conditions.

4. Proposed method of measuring concrete surface temperature changes.

5. Manufacturer's literature and material certification for proposed curing compounds.

PART 2 - PRODUCTS

2.01 LIQUID MEMBRANE-FORMING CURING COMPOUND

A. Curing compound shall comply with ASTM C-309 Type I, Class B. B. Minimum solids content of curing compound shall be 30%.

B. Moisture loss from concrete surface receiving compound shall not exceed 0.03 grams per square centimeter when applied at 300 square feet per gallon.

C. The curing compound shall be an emulsion which is freeze-thaw stable and displays a white color that disappears when dry.

D. Curing compound shall be SureCure 30 by Kaufman Products, Inc., CA D.O. T. Acrylic Cure by Symons Corporation, or Sealtight CS-309-30 by W. R. Meadows.

2.02 EVAPORATION REDUCER

A. Evaporation reducer shall be Master Builders, "Confilm", or Euclid Chemical "Euco-Bar".

PART 3 - EXECUTION

3.01 PROTECTION AND CURING

A. All freshly placed concrete shall be protected from the elements, flowing water and from defacement of any nature during construction operations.

B. As soon as the concrete has been placed and horizontal top surfaces have received their required finish, provision shall be made for maintaining the concrete in a moist condition for at least a 5-day period thereafter except for high early strength concrete, for which the period shall be at least the first three days after placement. Horizontal surfaces shall be kept covered, and intermittent, localized drying will not be permitted.

C. The Contractor shall use one of the following methods to insure that the concrete remains in a moist condition for the minimum period stated above.

1. Ponding or continuous fogging or sprinkling.

2. Application of mats or fabric kept continuously wet.

3. Continuous application of steam (under 150 degrees Fahrenheit)

4. Application of sheet materials conforming to ASTM C171.

D. The Contractor shall keep absorbent wood forms wet until they are removed. After form removal, the concrete shall be cured by one of the methods in paragraph C.

E. Any of the curing procedures used in Article 3.01 Paragraph C of this Section may be replaced by one of the other curing procedures listed in Article 3.01 Paragraph C of this Section after the concrete is one-day old. However, the concrete surface shall not be permitted to become dry at any time.

3.02 CURING CONCRETE UNDER COLD WEATHER CONDITIONS

A. Suitable means shall be provided for a minimum of 72 hours after placing concrete to maintain it at or above the minimum as placed temperatures specified in Section 03300 entitled "Cast-in-Place Concrete", for concrete work in cold weather. During the 72-hour period, the concrete surface shall not be exposed to air more than 20 degrees Fahrenheit above the minimum as placed temperatures.

B. Stripping time for forms and supports shall be increased as necessary to allow for retardation in concrete strength caused by colder temperatures. This retardation is magnified when using concrete made with blended cements or containing fly ash or ground granulated blast furnace slag.

Therefore, curing times and stripping times shall be further increased as necessary when using these types of concrete.

C. The methods of protecting the concrete shall be such that will prevent local drying. Equipment and materials approved for this purpose shall be on the site in sufficient quantity before the work begins. The Contractor shall assist the Engineer by providing holes in the forms and the concrete in which thermometers can be placed to determine the adequacy of heating and protection.

D. Curing procedures during cold weather conditions shall conform to the requirements of ACI 306.

3.03 CURING CONCRETE UNDER HOT WEATHER CONDITIONS

A. When air temperatures exceed 85 degrees Fahrenheit, the Contractor shall take extra care in placing and finishing techniques to avoid formation of cold joints and plastic shrinkage cracking. Temporary sun shades and/or windbreakers shall be erected to guard against such developments, including generous use of wet burlap coverings and fog sprays to prevent drying out of the exposed concrete surfaces.

B. Immediately after screeding, horizontal surfaces shall receive an application of evaporation reducer. Apply in accordance with manufacturer's instructions. Final finish work shall begin as soon as the mix has stiffened sufficiently to support the workmen.

C. Curing and protection of the concrete shall begin immediately after completion of the finishing operation. Continuous moist-curing consisting of method 1 or 2 listed in Article 3.01, Paragraph C of this Section is mandatory for at least the first 24 hours. Method 2 may be used only if the finished surface is not marred or blemished during contact with the coverings.

D. At the end of the initial 24-hour period, curing and protection of the concrete shall continue for at least four additional days using one of the methods listed in Article 3.01, Paragraph C of this Section.

E. Curing procedures during hot weather conditions shall conform to the requirements of ACI 305.

3.04 USE OF CURING COMPOUND

A. Curing compound shall be used only where specifically approved by the Engineer. Curing compound shall not be used on surfaces to receive subsequent coatings. Curing compound shall not be used on surfaces

exposed to water in potable water storage tanks and treatment plants unless curing compound is certified in accordance with ANSI/NSF Standard 61.

B. When permitted, the curing compound shall maintain the concrete in a moist condition for the required time period, and the subsequent appearance of the concrete surface shall not be affected.

C. The compound shall be applied in accordance with the manufacturer's recommendations after water sheen has disappeared from the concrete surface and after finishing operations. The rate of application shall not exceed 300 square feet per gallon. For rough surfaces, apply in two directions at right angles to each other.

3.05 EARLY TERMINATION OF CURING

A. Moisture retention measures may be terminated earlier than the specified times only when at least one of the following conditions is met:

1. The strength of the concrete reaches 85 percent of the specified 28-day compressive strength in laboratory-cured cylinders representative of the concrete in place, and the temperature of the in-place concrete has been constantly maintained at 50 degrees Fahrenheit or higher.

2. The strength of concrete reaches the specified 28-day compressive strength as determined by accepted nondestructive methods or laboratory-cured cylinder test results.

3.06 CURING AND PROTECTION

A. All concrete shall be cured for not less than 7 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:

Surface to be Cured	**Method**
Unstripped forms	1
Construction joints	2
All concrete surfaces not specifically provided for elsewhere in this Paragraph	3

B. Materials for curing concrete as specified herein shall conform to the following requirements:

1. Concrete curing compound shall be MB 429 as manufactured by Master Builders, Cleveland, OH; Hunt Process Clear ARB as manufactured by Hunt Process Co., Santa Fe Springs, CA; Select Cure CRB as manufactured by Select Products Co., Upland, CA; or equal. The curing compound shall contain a fugitive dye so that areas of application will be readily distinguishable.

2. Burlap mats: conform to ASTM Specification M182.

C. Method 1

1. Wooden forms shall be wetted immediately after concrete has been placed and shall be kept wet with water until removed. If steel forms are used the exposed concrete surfaces shall be kept continuously wet until the forms are removed. If forms are removed within seven days of placing the concrete, curing shall be continued in accordance with Method 3.

D. Method 2

1. The surface shall be covered with burlap mats which shall be kept wet with water for the duration of the curing period, until the concrete in the walls has been placed. No curing compound shall be applied to surfaces cured under Method 2.

E. Method 3

1. The surface shall be sprayed with a liquid curing compound.

2. It shall be applied in accordance with the manufacturer's 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.

3. Where the curing compound method is used, 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.

4. 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 wet sandblasting just prior to the placing of new concrete.

5. Where curing compound is specified, it shall be applied as soon as the concrete has hardened enough to prevent marring on unformed 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.

F. The Contractor shall protect all concrete against injury until final acceptance by the Owner. 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.

END OF SECTION

DIVISION 5

METALS

SECTION 05120
STRUCTURAL STEEL

PART 1 GENERAL

1.1 SECTION INCLUDES:

A. Structural steel framing members, support members, sag rods and struts.
B. Base plates, shear stud connectors, and expansion joint plates
C. Grouting under base plates

1.2 REFERENCES

A. AISC - Code of Standard Practice - Manual of Steel Construction - Allowable Stress Design (ASD) or Load and Resistance Factor Design (LRFD)
B. AISC - Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings, 9th Edition.
C. ASCE 7-98 - American Society of Civil Engineers – Wind Loads
D. ASTM 992- Structural Steel, ASTM A36, Channels, plates
E. ASTM A53 - Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe
F. ASTM A108 - Steel Bars, Carbon, Cold-Finished, Standard Quality
G. ASTM A123 - Zinc (Hot Dipped Galvanized) Coatings on Iron and Steel Products.
H. ASTM A153 - Zinc Coating (Hot Dip) on Iron and Steel Hardware
I. ASTM A242/A242M - High-Strength Low-Alloy Structural Steel.
J. ASTM A307 - Carbon Steel Externally Threaded Standard Fasteners.
K. ASTM A325 - High Strength Bolts for Structural Steel Joints.
L. ASTM A449 - Quenched and Tempered Steel Bolts and Studs.
M. ASTM A490 - Quenched and Tempered Alloy Steel Bolts for Structural Steel Joints.
N. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
O. ASTM A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
P. ASTM A514 - High-Yield Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding
Q. ASTM A529 - Structural Steel with 42 KSI Minimum Yield Point ½" Maximum Thickness
R. ASTM A563 - Carbon and Alloy Steel Nuts
S. ASTM A568 - General Requirements for Steel, Carbon and High-Strength Low-Alloy Hot-Rolled Sheet and Cold-Rolled Sheet
T. AWS A2.0 - Symbols for Welding, Brazing and Nondestructive Examination.
U. AWS D1.1 - Structural Welding Code
V. FM - Roof Assembly Classifications
W. SSPC (Steel Structures Painting Council) - Paint Manual.

X. UL - Fire Resistance Directory
Y. Florida Building Code.

1.3 SUBMITTALS FOR REVIEW

A. Section 01300 - Submittals: Procedures for submittals
B. Shop Drawings:
   1. Indicate profiles, sizes, spacing and locations of structural members, openings, attachments and fasteners.
   2. Connections
   3. Cambers and loads
   4. Indicate welded connections with AWS A2.0 welding symbols. Indicate net weld lengths.
   5. Shop Drawings shall be dated, signed and sealed by a Specialty Engineer registered in The State of Florida.

1.4 SUBMITTALS FOR INFORMATION

A. Section 01300 - Submittals: Procedures for submittals
B. Manufacturer's Mill Certificate: Certify that Products meet or exceed specified requirements.
C. Mill Test Reports: Submit indicating structural strength, destructive and non-destructive test analysis.
D. Welders' Certificates: Certify welders employed on the Work, verifying AWS qualifications within the previous 12 months.

1.5 QUALITY ASSURANCE

A. Fabricate structural steel members in accordance with AISC Code of Standard Practice.
B. Maintain one copy of each document on site.
C. Fabricator: Company specializing in performing the work of this section with minimum five years documented experience.
D. Erector: Company specializing in performing the work of this section with minimum five years documented experience.
E. Design connections not detailed on the drawings shall be done under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State of Florida.

1.6 REGULATORY REQUIREMENTS

A. Structural steel design and construction shall comply with Florida Building Code, ASCE 7-98 – Wind loads, and American Institute of Steel Construction, AISC "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings, 9th Edition."

B. Conform to UL, FM and Warnock Hersey Assembly.

1.7 DELIVERY, STORAGE AND PROTECTION

A. Section 01600 - Materials and Equipment: Transport, handle, store and protect product.

PART 2 PRODUCTS

2.1 MATERIALS

A. Structural Steel Members: ASTM A36 and A992, Grade 50.
B. Structural Tubing: ASTM A500, Grade B. ASTM A501.
C. Pipe: ASTM A53, Type E or S, Grade B.
D. Shear Stud Connectors: ASTM A108, Grade 1015, headed, uncoated.
E. Bolts, Nuts, and Washers: ASTM A307, A325 and A490 galvanized to ASTM A153 for galvanized members.
F. Anchor Bolts: ASTM A307 and A36.
G. Welding Materials: AWS D1.1; type required for materials being welded.
H. Sliding Bearing Plates: Teflon coated.
I. Grout: Non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 7,000 psi at 28 days.
J. Shop and Touch-Up Primer: SSPC Paint 15, Type 1. Provide a uniform dry film thickness of 1.5 mils.
K. Touch-up Primer for Galvanized Surfaces: SSPC 20 Type I Inorganic.

2.2 FABRICATION

A. Continuously seal joined members by intermittent welds and plastic filler. Grind exposed welds smooth.
B. Fabricate connections for bolt, nut and washer connectors.
C. Develop required camber of members.

2.3 FINISH

A. Prepare structural component surfaces in accordance with SSPC SP-2.
B. Shop prime structural steel members. Do not prime surfaces that will be fireproofed, field welded, in contact with concrete and high strength bolted.
C. Galvanize structural steel members to ASTM A123. Provide minimum 1.25 oz/sq ft galvanized coating.

2.4 SOURCE QUALITY CONTROL AND TESTS

A. Provide shop testing and analysis of structural steel sections.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01400 entitled “Quality Control” - Coordination and Meetings: Verification of existing conditions prior to beginning work

3.2 ERECTION

A. Allow for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.
B. Field-weld components and shear studs indicated on shop drawings.
C. Field-connect members with threaded fasteners; torque to required resistance.
D. Do not field cut or alter structural members without approval of A/E.
E. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.
F. Grout under base plates. Trowel grouted surface smooth, splay neatly to 45°.

3.3 ERECTION TOLERANCES

A. Maximum Variation From Plumb: ¼" per story, non-cumulative.
B. Maximum Offset From True Alignment: ¼".

3.4 FIELD QUALITY CONTROL

A. Section 01400 entitled “Quality Control”: Field inspection, testing of bolt torque, welds and torque of fasteners.

END OF SECTION

SECTION 05500
METAL FABRICATIONS

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish and install miscellaneous metal items as shown on the Drawings and specified herein for a complete installation.

1.02 SUBMITTALS

A. The Contractor shall submit shop drawings and other information to the Engineer for review in accordance with Section 01300 entitled "Submittals". No fabrication shall be started until shop drawings have been reviewed by the Engineer. The drawings shall be made in conformity with standard practice and indicate: fabrication, assembly and erection details, sizes of members, profiles, fastenings, supports and anchors, finishes, patterns, clearances, and connections to other work.

PART 2 - PRODUCTS

2.01 MATERIALS

A. All materials shall be of the best quality and entirely suited for the particular service. Metals shall be free from defects and have structural properties to safely render required service.

B. Fastenings shall, insofar as practicable, be noncorrosive, nonstaining and concealed. Exposed welds shall be ground smooth to form a neat uniform fillet without weakening base metal. Unexposed welds shall have all slag removed before applying shop coating. Moulded, bent or shaped members shall be formed and clean, sharp rises, without dents, scratches, cracks or other defects. All anchors, bolts, shims and accessory items shall be provided as required for building into or fastening to adjacent work. All ferrous metals shall be galvanized, except as otherwise specified.

C. Unless otherwise specified the miscellaneous metal work shall be equal to or exceed the requirements of the following standards:

Carbon and Low Alloy Steel	ASTM Designation
Plates and Structural Fabrication	A 36, A 529 or A 283, Grade C

Sheet Steel	A 570, Grade C
Bars and Rods	A 36 or A 306, Grade 60
Pipe - general use process pipe	A 53 or A 120 Schedule 40 A 524 Grade I
<u>Fasteners*</u>	
Standard Strength Bolts	A 307, Grade A
High Strength Bolts	A 325
Eyebolts	A 489
<u>Steel Coatings</u>	
Zinc - Electrodeposited	A 164
Hot Dipped	A 123 and A 386
Cadmium	A 165
<u>Stainless Steel</u>	
Plate and Sheets	A 167, Type 316
Bars and Shapes	A 276, Type 316
Fasteners*	A 167 and A 276, Type 316
<u>Cast Iron</u>	
Gray	A 48. Class 30B
Malleable	A 47
Ductile	A 536, Grade 60-40-18
<u>Wrouqht Iron</u>	
Plates	A 42
Sheets	A 162
Shapes and Bars	A 207
Pipe	A 72
<u>Bronze</u>	
Rods, Bars, and Shapes	B 138, Alloy B Soft
<u>Fasteners</u>	
Yellow Brass Cap Screws and Other Small Fasteners	B 16, B 36, or B 134
Silicon Bronze Bolts	B 97, B 98, B 99 and B 124
<u>Aluminum</u>	
Structural Shapes	B 308, Alloy 6061- T6
Castings	B 26, B 85 and B 108
Extruded Bars, Rods and Tubes	B 221 Bars - Alloy 6061 Other - Alloy 6063
Plates and Sheet	B 209 Plates - Alloy 6061 Sheets - Alloy 3003

*All fasteners shall be manufactured in the U.S.A. Certifications of compliance shall be submitted for all fasteners supplied on this project.

D. Materials with more than one specification or grade listed shall conform to specification or grade providing the highest strength and appropriate mechanical properties for the fabrication technique used.

2.02 PROTECTIVE COATINGS

A. All ferrous metal, except stainless steel and galvanized surfaces, shall be properly cleaned and given one shop coat of primer compatible with the coating system specified in Section 09850 entitled “Painting", Metal work, including anchors, to be encased in concrete shall be shop primed unless specified to be stainless steel or galvanized.

Castings that are to be left unpainted shall be cleaned and coated with a coal-tar-pitch varnish.

B. Hot-dip galvanizing or zinc coatings applied on products fabricated from rolled, pressed or forged steel shapes, plates, bars and strips shall comply with ASTM A 123. Hot-dip galvanizing or zinc coatings on assembled steel products shall comply with ASTM A 386. The weight of coatings shall be designated in Table 1 for the class and thickness of material to be coated.

C. Galvanized surfaces for which a shop coat of paint is specified shall be chemically treated to provide a bond for the paint. Except for bolts and nuts, all galvanizing shall be done after fabrication.

D. Aluminum to be placed adjacent to masonry or dissimilar metals shall be protected with an isolating coating of bitumastic and/or felt.

2.03 STEEL

A. Unless otherwise noted, all steel shall conform to the following:

1. Carbon steel bolts and fasteners shall conform to ASTM A 307 and shall be galvanized.

2. Other steel shall be mild steel.

2.04 STRUCTURAL AND MISCELLANEOUS ALUMINUM

A. All structural and miscellaneous aluminum shapes, bars and plates shall be Alloy 6061- T6. Aluminum to be placed adjacent to concrete, masonry or dissimilar metals shall be protected with one coat of bitumastic paint. Mill finish shall be provided.

2.05 FASTENERS

A. General: Bolts, screws, nuts, washers, anchors and other fasteners shall be first quality and shall conform to the material specifications named herein. All necessary bolts, anchor bolts, nuts, washers, plates and bolt sleeves shall be furnished by the Contractor in accordance herewith. Anchor bolts shall have suitable washers and, where so required, their nuts shall be hexagonal. Stainless steel and silicon bronze bolts shall have a raised letter or symbol on the bolts indicating the manufacturer.

Concrete and masonry inserts shall be drill-in type as manufactured by Phillips Drill Company, Michigan City, Indiana; Hilti, Tulsa, OK; or equal. Powder or gun-driven, fiber, and plastic inserts shall not be used unless specifically noted.

B. Material: All bolts, anchor bolts, nuts, washers, plates, and bolt sleeves shall be galvanized.

Bolts, anchor bolts, nuts and washers specified to be galvanized shall be zinc coated, after being threaded, by the hot dip process in conformity with ASTM A 123, or A 153, as is appropriate.

C. Concrete Inserts: Concrete inserts shall be designed to support safely, in the concrete that is used, the maximum load that can be imposed by the bolts used in the inserts.

D. Dissimilar Metal: All dissimilar metal shall be connected with appropriate fasteners and shall be insulated with a dielectric or approved equal. Unless otherwise specified, aluminum shall be fastened with ASTM A276 Type 316 stainless steel bolts and insulated with micarta, nylon, rubber, or equal.

E. Anchor Bolts: Anchor bolts shall be set accurately and be carefully held in suitable templates of approved design. Where indicated on the Drawings, specified, or required, anchor bolts shall be provided with square plates at least 4-inches by 1/8 inch or shall have square heads and washers and be set in the concrete forms with suitable pipe sleeves, or both. Drill-in type anchors shall be as shown on the Drawings.

PART 3 - EXECUTION

3.01 FABRICATION

A. General: All workmanship shall be first class and conform to recognized and accepted best practice. All structural materials shall be thoroughly straightened in the shop by methods that will not injure them before

templates are placed on same for laying out and before any work is done upon them.

B. Finished members shall be absolutely straight and free from open joints and distortions of any kind. All shearings shall be neatly finished. Flame cutting may be used in the preparation of the various members provided this operation is performed by a machine. All necessary fillets, connections, brackets, posts, and other details not shown on the drawings, but necessary for the work, shall be furnished by the Contractor. Fabrication shall be by welding except where riveted construction is specifically allowed by the Contract Documents.

C. Steel: Steel fabrication shall meet the applicable requirements of the AISC Specification for Design, Fabrication, and Erection of Structural Steel for Buildings.

D. Aluminum: Aluminum fabrication shall meet the applicable requirements of the Aluminum Construction Manual, Specifications for Aluminum Structures.

E. Welding: All welding shall be in accordance with the latest revised standards and recommendations of the American Welding Society. The welding of all joints shall produce complete fusion with the parent metal and shall be free from deleterious metals and cracks. Machine welding shall be used insofar as practicable. Tack welding will not be permitted on exposed surfaces. Finished welded joints shall be reasonably smooth and free from grooves, depressions or other irregularities. Any other irregularities shall be corrected by welding and/or grinding. All scale or flux shall be removed after each pass. Bronze shall be welded by either the inert gas shielded arc method or by brazing with the proper flux and filler metal. All flush welds of butt joints shall be ground smooth where exposed to view.

F. Castings:

1. Castings shall be tough, sound and free from blow holes, shrinkage cracks or other defects. Castings shall be smooth and clean. Units that have been plugged or filled will be rejected.

2. Iron castings shall be close-grained gray iron or ductile iron.

3.02 INSTALLATION

A. All miscellaneous items shall be installed in conformance with specifications and details as shown on the drawings, or processed shop drawings. Installation and erection shall conform to the best practice with

each item set plumb, level, true to line and securely anchored in its proper place.

END OF SECTION

SECTION 05510
ALUMINUM STAIRS

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish, fabricate, and install miscellaneous metalwork for stairs and appurtenances, complete, all in accordance with requirements of the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 05500 - Metal Fabrications

B. Section 05520 - Handrail and Railings

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Specifications, codes and standards shall be as specified in Section entitled "Metal Fabrications" and as referred to herein.

1.04 SUBMITTALS

A. Shop drawings of all metal stairs shall be submitted to the Engineer for review in accordance with Section entitled "Metal Fabrications".

PART 2 - PRODUCTS

2.01 MATERIALS

A. Materials to be used for metal stairs shall conform with specifications, codes and standards as specified in the Section entitled "Metal Fabrications", and as referenced to herein.

B. All metal stairs shall be fabricated from Aluminum alloy 6061-T6 unless otherwise indicated on the drawings.

C. All fasteners used for metal stairs shall be Type 316 SS.

2.02 METAL STAIRS

A. Metal stairs shall be fabricated in accordance with OSHA, the standard practice of the National Association of Ornamental Metal Manufacturers, and as indicated on the Drawings.

B. Aluminum stair treads shall be of the same pattern and alloys as the aluminum grating, be of the pressure locked type, shall be a minimum of 1-1/2-inches deep main bars with cross bars at 2 inches on center and shall have 1-1/4-inch wide abrasive nosing.

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 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. Provide anchors, plates, angles, hangers and struts required for connecting stairs to structure.

C. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

D. Field weld components indicated on Drawings. Perform field welding in accordance with AWS D1.1.

E. Field bolt and weld to match shop bolting and welding. Conceal bolts and screws whenever possible.

F. Mechanically fasten joints butted tight, flush, and hairline. Grind welds smooth and flush.

G. Obtain Engineer approval prior to site cutting or making adjustments not scheduled.

H. 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 corners 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 05520
HANDRAILS AND RAILINGS

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish, fabricate, and install handrails and railings and appurtenances, complete, all in accordance with the requirements of the Contract Documents. Handrails and railings for the Administration Building shall conform to the Architectural Drawings. All other handrails and railings shall conform to this Section and the Structural Drawings.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 05500 - Metal Fabrications

B. Section 05510 – Aluminum Stairs

1.03 SUBMITTALS

A. Shop drawings of all handrails and railings shall be submitted to the Engineer for review in accordance with Section 01300 entitled "Submittals."

PART 2 - PRODUCTS

2.01 ALUMINUM RAILING SYSTEM

A. General: Where indicated on the Drawings, pipe handrailing shall be provided. Pipe handrailing shall be supplied as required by the Florida Building Code (FBC) and OSHA whether indicated on the Drawings or not.

B. Vertical pipe supports shall be side mounted as shown on the Drawings.

C. Wall brackets for handrail shall be of designs indicated on the Drawings and shall be as manufactured by Wagner Companies (J.G. Braun Company), or equal.

D. All connections between vertical posts and horizontal railing or between sections of horizontal railings shall be shop welded continuous in as long of sections as practical. All welds shall be water tight and ground smooth. Field assembly of welded sections may be made by field welding. Railings and posts shall be removable at

locations indicated. Location and type of field connections shall be subject to the Engineer's review. Weep holes shall be shop drilled in all vertical posts of external railing.

E. Design Load: All components of the railings and the railing system shall be adequately designed to resist the design loads of the FBC. In no case shall the spacing of vertical pipe supports exceed five feet.

F. Aluminum Railing: Exterior aluminum pipe railings and posts shall be nominal l-1/2 inch diameter, aluminum alloy 6061-T6 with mill finish. Posts shall be Schedule 80 minimum, horizontal railings shall be Schedule 40 minimum. Railing posts shall be adequately reinforced to meet the specified design loads. In no case shall the spacing of handrail posts exceed five feet on center. Stainless steel railings may be used in lieu of aluminum railing at the CONTRACTOR'S option.

G. Kickplates: Kickplates shall be furnished even if not specifically shown on the Drawings and installed typically at the edges of all metal walkways and at other handrail installations. Kickplates shall be l/4-inch thick, must meet OSHA requirements, shall project 4-inches above walkway surface, may not infringe on minimum required walkway width and material must be the same as that of handrail construction. Kickplates shall be connected to handrail posts as detailed on the drawings.

H. Existing railings that are specified to be removed, shall be cut and disposed off site. Posts shall be removed to two inches below existing surfaces and grouted smooth.

I. At locations where fabricated railings are to tie-in to existing railings, the design of the new railings shall match the existing conditions. Kickplates shall be provided at all new railing locations. Horizontal railings shall be field welded to the closest existing posts. All field welds shall be ground smooth. Finish of new railing shall match existing railings.

2.02 FASTENERS

A. Stainless steel Type 316 fasteners shall be furnished by handrail manufacturer.

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 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. Provide anchors and plates required for connecting railings to structure.

C. Aluminum Railings: Aluminum railing fabrication shall be performed by craftsmen experienced in the fabrication of architectural metal work. Exposed surfaces shall be free from defects or other surface blemishes. Dimensions and conditions shall be verified in the field. All joints, junctions, miters and butting sections shall be precision fitted with no gaps occurring between sections, and with all surfaces flush and aligned. Electrolysis protection of materials shall be provided. All dissimilar materials shall be isolated.

3.04 EPOXY ANCHOR BOLTS

A. Epoxy anchor bolts shall be spaced a minimum of 10d apart and 6d edge distance (d=diameter of bolt). A safety factor of four shall be provided on epoxy anchor bolt pull out values published by the manufacturer.

3.05 ALUMINUM SURFACES

A. Aluminum surfaces in contact with concrete, grout or dissimilar metals shall be protected with a coat of bitumastic or other approved materials.

END OF SECTION

DIVISION 6

WOOD AND PLASTICS

SECTION 06600
FABRICATED FIBERGLASS

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. Furnish all labor, material, equipment and incidentals to fabricate and install the items specified herein and shown on the Drawings. This shall apply to all miscellaneous fiberglass fabrications.

1.02 QUALITY ASSURANCE

A. Products to comply with the current edition of the applicable National Bureau of Standards, Voluntary Product Standard PS 15.

B. Safety factors: Liberal safety factors shall be used in the design of all products. Working stresses shall not exceed the lower value of one-third of the yield strength or one-fifth of the ultimate strength of the material. The fiberglass products shall be designed for stresses to which these products will be subjected during fabrication, erection and continuous operation as shown on the drawings.

1.03 SUBMITTALS

A. Shop drawings: Submitted in accordance with Section 01300 entitled "Submittals" shall include detailed design calculations for all fabricated products.

PART 2 - PRODUCTS

2.01 GENERAL

A. Products shall be furnished by manufacturers having a minimum of 5 years' experience in the manufacture of similar items with a record of successful installations. Support members shall be as shown on the Drawings and as required in this Section.

2.02 MATERIALS

A. Fiberglass structural shapes:

1. Structural FRP members supplied under this Section shall be manufactured using the pultrusion process. The composite shall consist of

a glass fiber reinforced polyester resin matrix, approximately 50 percent resin to glass ratio.

2. Glass reinforcement shall be of three varieties:

   a. A surfacing mat shall be used on all exterior surfaces for maximum chemical resistance.

   b. Continuous glass strand rovings shall be used internally for longitudinal strength.

   c. Continuous strand mats shall be used internally for transverse strength.

3. Resin shall be a halogenated polyester, possessing inherent fire and chemical resistance. Antimony trioxide shall be added (3 to 5 percent) to impart Class I flame spread and flammability ratings as per ASTM E-84 and D-635.

4. The following minimum mechanical properties shall apply.

   a. Ultimate tensile strength 30,000 psi (longitudinal coupon)
      Ultimate tensile strength 7,000 psi (transverse coupon)
      Ultimate tensile strength 20,000 psi (full section in bending)

   b. Ultimate compressive strength 30,000 psi (longitudinal coupon)
      Ultimate compressive strength 15,000 psi (transverse coupon)
      Ultimate compressive strength (full section in bending) 20,000 psi

   c. Ultimate shear strength 5,500 psi

   d. Ultimate bearing strength 30,000 psi

   e. Modulus of elasticity (full section in bending) 2.5×10^6

   f. Barcol hardness 50

5. All fiberglass intended for external usage shall be gel coated for UV inhibition.

B. Miscellaneous FRP Supports: Minor FRP channels, unistrut, and supports (including clamps and hardware) for small diameter piping (less than 2-inches in diameter), or where otherwise required by drawings, shall be as manufactured by Aickenstrut.

C. FRP Grating: All grating shall be minimum 1-1/2 inch in depth, flush mounted and able to withstand a 350 pound concentrate load and 100 psf uniform load on a 4.5 foot span with a safety factor of 10 and a deflection of less than 0.30 inches in accordance with the span requirement shown on the drawings. The FRP grating shall be molded from standard fiberglass channel resistant resin. Resin shall be suitable for continuous exposure to highly corrosive acid, alkaline and solvent environments. All cut edges or openings shall be sealed with sealing materials supplied by the manufacturer. The top sides of all grating shall be treated with FRP anti-skid material. The grating shall be supported on embedded or shelf angles, sized by the manufacturer, as shown on the drawings. Support angles shall be of the same material as the grating and satisfy the criteria of this specification. All FRP shelf angles shall be secured with hardware suitable for contact with 20% sodium hydroxide and 12.5% sodium hypochlorite and approved by the Engineer. The grating shall be manufactured by Fibergrate Corporation with VI-CORR premium vinyl ester resin.

PART 3 - EXECUTION

3.01 INSTALLATION

A. All work shall be erected level, and/or plumb, and shall meet required heights, layout and details precisely. All work shall be adequately fastened, anchored or braced using Type 316 stainless steel hardware.

B. All work shall be executed in accordance with the best practices of the trade, by persons skilled in the craft.

C. Installation shall be in strict accordance with manufacturer's instructions and recommendations in the locations shown on the drawings.

D. All fiberglass installations shall be suitably braced and supported to be fully rigid, stable and secure. Acceptability in this regard shall be solely the Engineer's opinion.

3.02 INSPECTION AND TESTING

A. Final acceptance test shall demonstrate that products have been properly installed and are in correct alignment.

END OF SECTION

SECTION 06620
FIBERGLASS-REINFORCED PLASTIC (FRP) DUCTWORK

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. This Section specifies the requirements necessary to furnish and install, complete, the inlet and discharge fiberglass-reinforced plastic (FRP) ductwork for the lime dust collector unit to be installed on the third floor, roof deck of the lime building, immediately above the existing lime storage bins as shown on the Drawings.

1.02 DESIGN CRITERIA

A. All FRP ductwork shall be in accordance with the latest editions of ASHRAE Handbook, National Standard PS 15-69, SMACNA Industrial Duct Construction Standards, and the Standard Mechanical Code. Where conflict among these references arises, the most stringent source shall be followed, as determined by the Engineer.

B. Ductwork fabricated for this project must meet all requirements of ASTM D2996 for filament wound pipe, ASTM C581, standard practice for determining chemical resistance of thermose.

C. SERVICE DUTY

1. Duct Pressures: FRP exhaust ductwork shall be suitable for pressures of 15-inches WC negative to 20-inches WC positive inside the duct. The manufacturer shall certify that the duct is designed to satisfy this criteria.

2. Temperature range up to 250°-Fahrenheit

D. SUPPORTS, ANCHORAGE AND RESTRAINTS

1. General

a. When supports, anchorages and restraints for equipment, piping and ductwork are not shown on the Drawings, the Contractor shall be responsible for their design and installation. The system shall be designed to withstand applicable local and land criteria. All calculations shall be signed and sealed by a Florida Registered Professional Engineer. All ductwork shall be rigidly supported.

1.03 QUALITY ASSURANCE

A. All FRP ductwork shall be fabricated and installed by qualified, experienced personnel who have a minimum of 5 years experience with lay-up, filament wound or contact molded, and fabrication and joining of this type of material.

1. All resins used in the fabrication of FRP ductwork shall be approved for intended use. Apply resins in accordance with the Vendor's published technical Criteria.

2. FACTORY INSPECTION

   a. The Engineer shall maintain the right to tour the FRP duct manufacturer's plant any time that fabrication is being performed on ductwork intended for this project.

   b. At any time the Engineer may exercise the option, without any advance notice, to tour the plant and inspect stages of fabrication to ensure that quality control is being maintained.

   c. The visitation and inspection option shall remain in effect throughout the entire cycle of production for materials used on this project.

3. FACTORY SUPPLIED TEST SAMPLE

   a. At the Engineer's request, the duct fabricator shall provide a minimum of three sample specimens for mechanical property tests and lamination lay-up analysis. Test specimens shall be submitted to the Engineer and Vendor of the resins used in the duct construction process.

   b. Number and log all manufactured duct sections. Log entries must contain piece number, description and date of manufacture. The log or log copy shall be delivered with each shipment.

1.04 SUBMITTALS

Provide the following shop drawing submittals:

A. Complete specifications, descriptive drawings, catalog cuts and descriptive literature which shall include data on the duct material, hanging weight, fabrication techniques, resins and fillers proposed to the finished duct material.

B. Drawings of the duct layout at the same scale as the building drawings or a minimum of 1/8-inch scale, showing location and dimensions of all main and branch runs, fittings, offsets, takeoffs and accessories.

C. Detailed information of structural, mechanical or other changes or modifications necessary to adopt materials to the arrangement or details shown.

D. Recommended procedure for the protection and handling of materials prior to installation.

E. Shop drawings of suspended ductwork indicating point loads and seismic restraint locations, along with applicable details keyed to layouts.

F. Show drawings for support frames, equipment and ductwork supports and associated anchorage point load locations, along with Contractor's calculations and details to the layouts.

1.05 ACCEPTABLE MANUFACTUERS

Fiberglass ductwork shall be fabricated by one of the following manufacturers:

A. DEI Systems, Salt Lake City, Utah

B. Jacobs Air Water Systems, Tampa, FL

PART 2 – PRODUCTS

2.01 FRP DUCTWORK

A. INTERNAL CORROSION-RESISTANT SURFACE:

1. The internal liner in contact with the air stream shall be constructed of materials resistant to lime (i.e. calcium oxide and calcium hydroxide).

2. Thickness of this corrosion liner shall be 50-mil minimum, specifically layed up as a corrosion barrier and formed separately from the materials and procedures of the intermediate structural layers.

3. Resins used for this internal corrosion-resistant liner shall only be: Derakane 510A

B. INTERMEDIATE STRUCTURAL LAYER:

1. The intermediate layer of duct wall thickness shall be fabricated by either filament wound or hand laid-up techniques to the dimensional thickness and strength required by the ASTM Standards.

2. The outer surface shall be relatively smooth with no exposed glass fiber ends.

3. Resins used for this intermediate structural layer shall be selected for their strength characteristics.

C. EXTERNAL LAYER:

1. Outdoor Ductwork:

a. The exposed external surface of all FRP ductwork installed outdoors, whether on grade or on roof, shall provide protection against ultraviolet degradation and weather erosion. The duct shall carry the flame spread rating of 25 or less and a smoke contribution rating of in excess of 1,000.

b. External duct protection shall be provided by an ultraviolet stabilizer added to the final coat of resin that also incorporates paraffinated wax curing elements and color pigment.

c. An alternative system to polyurethane paint with color pigments may be used if approved by the Engineer.

2.02 DAMPERS

A. Equipment isolation dampers, header separation manifold dampers and exhaust branch duct balancing dampers shall be manufactured using the same materials as the ductwork. Round dampers shall be single butterfly blade type. Damper blade shall be non-binding with blade to wall clearance of not greater than 0.005 inch. Construct damper bodies from a one-piece mold with flanges molded to the barrel. Shafts shall be fitted with seal roller or ball bearing external to the air stream and protected by a corrosion-resistant shat seal. The bearing carriers shall be bonded to the damper barrel. Support the damper operator shaft with an external bearing mounted to the carrier bracket. Damper shafts and blade shall be constructed of FRP or FRP-coated stainless steel. All damper operators located 6-feet or less overhead shall be equipped with lever operators. Damper operators located higher than 6-feet shall be equipped with chain drive operators which are suitable of outdoor applications.

B. Rectangular control dampers shall be opposed-blade with external linkage, sealed shaft bearings and Teflon blade seals. Rectangular back draft dampers shall be parallel-blade type with external linkage, sealed shaft bearings and Teflon blade seals. Blade shaft shall be fiberglass-coated Type 316 SS. Blade shaft shall have a neoprene or Teflon shaft seal. Damper will be supported on external bearings. Bearings may be either ball type or pressed-fit Teflon onto the shaft. The shaft seal shall not have any bearing load applied to it. Damper shall also have locking quadrants with adjustable stops.

C. Blast Gate Dampers: Fabricated from duct construction materials with reinforced core of foam or honeycomb. The finished gate thickness shall not be less than 7/8 inch. Finish gate's smooth surfaces and edges with accurate fit to the gate receiver.

Size gates for not more than 50 pounds. Trim all excess material to minimize surface area. Provide a 100 percent seal gate receiver cover plate with corrosion-resistant hardware to be installed when the gate is removed. The gate receiver section may be fabricated as part of the duct to be fitted with bell ends for field bonding. Provide nylon blade position locking bolts bonded to the gate opening. For ducting 16-inch diameter, or greater, independently support blast gate dampers for complete rigidity in the full open position.

2.03 DRAINS

A. Provide duct drains in the bottom of all main and branch ducts as shown on the Drawings, or as required, to facilitate condensate removal. At a minimum, drains shall be located at every rise and at the head of all drops. Install drain lines as shown in details on the drawings.

2.04 FLEXIBLE CONNECTORS

A. Provide flex connectors at all inlet and outlet connections to the lime dust collector unit. Flex connectors shall be designed to ensure vibration isolation between the dust collector unit and FRP duct during the bag shaking phase of the lime loading operation. Flex connectors shall be flanged, constructed of materials of similar chemical resistance as duct system and provided by the ductwork vendor.

2.05 HANGERS AND SUPPORTS

A. Support FRP ductwork using details and methods described in the SMACNA Industrial Duct construction Manual.

B. Protect the duct form clamping force of strap hangers with a 1/8-inch thick layer of neoprene pad.

C. When the anchors are required, they shall be externally bonded to the duct. Drive screws or other penetrations of the duct linter are not permitted.

D. Maximum spacing of supports shall not exceed 12 feet for sizes 8 inches and under or 20 feet for ducts over 20 inches.

E. Provide supports which are independent of equipment and walls.

F. Vibration isolation for hangers shall be constructed using industry standard systems and devices.

PART 3 – EXECUTION

3.01 INSTALLATION

A. GENERAL

1. All materials and equipment shall be installed as shown and described herein and may be required by the applicable codes of the State and City. Drawings do not attempt to show exact details of all ductwork and no extra payment will be allowed for obstruction by work of other trades or local obstructions to the work under this contract with required offsets. Where diagrams have been made to show duct connections, the Contractor is cautioned that these diagrams must not be used for obtaining material quantities.

2. Changes in location of equipment of ductwork, advisable in the opinion of the Contractor shall be submitted to the Engineer for review before proceeding with the work. All measurements and dimensions shall be verified at the site. All equipment shall be adjusted and left in a condition satisfactory to the Engineer.

3. Any preparation of the structural components of the building required for equipment and material regarding this unit of the contract shall be done by the particular affected trade and shall be done to the satisfaction of the Engineer.

4. All workmanship shall be done onsite unless grinding operation is tented with HEPA filtration.

5. Slope ducts as indicated on the Drawings, or a minimum of one sixteenth of an inch per linear foot of duct, toward the drains.

B. Backdraft Dampers: Provide backdraft dampers where indicated with material and construction selected for compatibility with the intended service. Submit shop drawings.

3.02 FIELD QUALITY CONTROL

A. Supplier's/Manufacturer's Services: The suppliers and/or manufacturer's representative for the material specified shall be presented at the jobsite as requested by the Contractor for installation assistance, inspection and approval of the installation, testing, startup assistance and inspection during normal operation.

B. TESTING, GENERAL

1. Repair all leaks and restart test until stipulated results are achieved.

2. Advise the Engineer 48 hours in advance of each test. Failure to do so will require that the test be rescheduled.

3.03 CLEANING

A. Thoroughly clean all parts of the installation at the completion of the work. All surface defects and scuff marks shall be removed or painted. The Contractor shall clean up and remove from the premises all refuse material, crates and rubbish arising from his work.

END OF SECTION

DIVISION 9

FINISHES

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. Coatings used in contact with potable water supply shall be approved for use with potable water and shall not impart a taste or odor to the water. Coating shall conform to NSF Standard 60-2001 and Addendum 1.0-2001 to NSF Standard 60-2001.

D. All building, facilities, structures, and appurtenances, as indicated on the Drawings and as specified herein, shall be painted with not less then 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, 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 graphic panels, electrical equipment, toilet partitions, lockers, instrumentation, etc., 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.

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".

G. Project work is located in a wellfield protection zone. Disposal of paints, cleaners, and solvents shall not be permitted on site. Washing of brushes or rollers with disposal to the ground shall not be permitted on site.

1.03 MANUFACTURERS

A. All painting materials shall be as manufactured by Tnemec, Carboline, or Ameron.

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 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. 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 manufacturer's 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 meet 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 list:

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. Before application of the prime coat and each succeeding coat, all surfaces to be coated shall be subject to inspection by the Engineer. Any defects or deficiencies shall be corrected by the Contractor before application of subsequent coating.

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.

D. Where special coatings are to be performed by a subcontractor, the Contractor shall provide five references which show that the painting subcontractor has previous successful experience with the specified or comparable coating systems. Include the name, address, and the telephone number for the owner of each installation for which the painting subcontractor provided the protective coating.

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. All paints must comply with the requirements of the National Ambient Air Quality Standards.

1.09 SURFACES NOT TO BE COATED

A. The following list of items shall not be coated unless otherwise noted.

1. Type 316 stainless steel work.

2. Galvanized checkered plate and galvanized pipe stands.

3. Aluminum handrails, walkways, windows, louvers, grating and checkered plate.

4. Flexible couplings, lubricated bearing surfaces, insulation and plastic pipe and conduit.

5. Packing glands and other adjustable parts of mechanical equipment.

6. Finish hardware.

7. Plastic switch plates and receptacle plates.

8. Signs and nameplates.

1.10 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.

1.11 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.

C. All painting material shall be stored in a clean, dry, well-ventilated place, protected from sparks, flame, and direct rays of the sun or from excessive heat. Paint susceptible to damage from low temperatures shall be kept in a heated storage space when necessary.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Table 09900-1 depicts the coatings referenced in Article 3.03, "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

Tnemec Ref. No.	**Description**	**Manufacturers Reference Tnemec**
N69-Color	Polyamidoamine Epoxy	Hi-Build Epoxoline II
66-1255	Epoxoline Primer	Hi-Build Epoxoline Primer
66-Color	Polyamide Epoxy	Hi-Build Epoxoline
73-Color	Aliphatic Acrylic Polyurethane	Endura-Shield
157	Modified Waterborne Acrylate	Envirocrete (Sand Texture)
20	Polyamide Epoxy (NSF approved)	Potapox

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 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, all exterior, exposed flanged joints shall have the gap between adjoining flanges and the gap between threaded-on flanges and the pipe barrel sealed with a single component Thiokol caulking prior to painting 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 and the underside of the Anaerobic Digester covers. 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 2500 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. Galvanized and Copper Alloy Surfaces

1. All copper, or galvanized metal surfaces shall be given one coat of epoxy primer.

N. Concrete and Masonry Surfaces

1. Concrete and masonry 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 and masonry surfaces are to be cured for at least 28 days prior to coating them.

3. Concrete and masonry surfaces subject to foot traffic should be provided with slip resistant finish.

O. 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.

P. Existing Painted Concrete and Masonry Surfaces

1. Existing painted concrete and masonry 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.

Q. Existing Painted Exterior Piping and Equipment.

1. Existing painted exposed piping and equipment requiring paint shall be cleaned per SSPC-SP1 solvent cleaning and scarified (hand sanded). All rust shall be removed per SSPC-SP2 and SP3 (hand and power tool cleaning). All areas cleaned per SSPC-SP2 and SP3 shall be spot primed using Tnemec Series 135, or equal, 2.0 to 4.0 Mils OFT.

R. Wood Surfaces

1. Wood surfaces to be painted shall be cleaned of dirt, oil, and other foreign substances with mineral spirits, scrapers, and/or sandpaper. Finish surfaces exposed to view shall be made smooth by sandpapering. All wood items to be painted and in contact with or built into concrete, masonry or plaster shall be primed. Small, dry, seasoned knots shall be surface scraped and thoroughly cleaned, and shall be given a thin coat of knot sealer before application of the primer coat. Pitch on large, open, unseasoned knots and all other beads or streaks of pitch shall be scraped off, or if still soft, shall be removed with mineral spirits or turpentine and the resinous are thinly coated with no sealer.

2. After priming, all holes and imperfections in finish surfaces shall be filled with putty or plastic wood-filler colored to match the finish coat, allowed to dry, and sandpapered smooth. Unless otherwise authorized, painting shall proceed only when the moisture content of the wood does not exceed 12 percent as measured by a moisture meter.

S. PVC Pipe Surfaces

1. All pipe surfaces shall be lightly sanded before painting.

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 "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, Submerged Exposure

1. Metal surfaces that are submerged in potable water including but not limited to the following types of surfaces shall be painted as described below:

   a. Piping and valves.
   b. Miscellaneous steel plates and fasteners

Application	**No.**	**Product Name**	**DFT**
First - 1 coat	66-Color	Hi-Build Epoxoline	3.0 - 5.0
Finish - 1 coat	66-Color	Hi-Build Epoxoline	4.0 - 6.0
		Min. Total	10.0 Mils.

* Coating must be approved for potable water service in accordance with NSF Standard 61."

C. Metal Surfaces, Atmospheric (Exterior) Exposure

1. Metal surfaces exposed to the atmosphere that do not come into contact with corrosive atmosphere including the following types of surfaces shall be painted as described below:

   a. Pumps, motors, machinery, vessels, etc.
   b. Above ground piping, valves and pipe supports. (Also see pipe color , scheme.)
   c. Miscellaneous steel shapes, angles, etc.
   d. Exposed surfaces of electric panels, conduit, ventilation fans, air conditioning units, duct work, etc.
   e. Monorails

Ferrous Metal

Application	**No.**	**Product Name**	**DFT**
First - 1 coat	66-1255	Hi-Build Epoxoline Primer	3.0 – 5.0
Second – 1 coat	66-Color	Hi-Build Epoxoline	2.0 – 3.0
Finish - 1 coat	73-Color	Endura Shield	2.0 – 3.0
		Min. Total	9.0 Mils.

Non-Ferrous Metal

Application	No.	Product Name	DFT
First - 1 coat	66-Color	Hi-Build Epoxoline	2.0 – 3.0
Second - 1 coat	73-Color	Endura Shield	2.0 – 3.0
		Min. Total	5.0 Mils.

Galvanized

Application	No.	Product Name	DFT
First - 1 coat	66-Color	Hi-Build Epoxoline	2.0 – 4.0
Second - 1 coat	73-Color	Endura Shield	2.0 – 4.0
		Min. Total	5.0 Mils.

D. Metal Surfaces, Interior Exposure

1. Interior metal surfaces (nonsubmerged) that do not come in contact with the corrosive atmosphere including the following types of surfaces shall be painted as follows:

   a. Pumps, motors, machinery, etc. b. Piping, valves and supports.

   b. Miscellaneous steel shapes, angles, etc.

   c. Exposed surfaces of electric panels, conduit, ventilation fans, air conditioning units, duct work, etc.

   d. Interior doors and frames.

Ferrous Metal

Application	No.	Product Name	DFT
First - 1 coat	N69-Color	Hi-Build Epoxoline II	5.0 – 7.0
Finish - 1 coat	N-69 Color	Hi-Build Epoxoline II	5.0 – 7.0
		Min. Total	12.0 Mils.

Galvanized

Application	No.	Product Name	DFT
First - 1 coat	66-Color	Hi-Build Epoxoline	2.0 – 4.0
Second - 1 coat	73-Color	Endura Shield	2.0 – 4.0
		Min. Total	5.0 Mils.

E. Ductile Iron Pipe, Exterior or Interior Exposure

1. Ductile iron pipe exterior or interior exposure shall receive the following types of paint:

Interior

Application	No.	Product Name	DFT
First - 1 coat	N69-Color	Hi-Build Epoxoline II	5.0 – 7.0
Finish - 1 coat	N69-Color	Hi-Build Epoxoline II	5.0 – 7.0
		Min. Total	12.0 Mils.

Exterior

Application	No.	Product Name	DFT
First - 1 coat	N69-Color	Hi-Build Epoxoline Primer	3.0 – 4.0
Second - 1 coat	66-Color	Hi-Build Epoxoline	2.0 – 3.0
Finish – 1 coat	73-Color	Endura Shield	2.0 – 3.0
		Min. Total	8.0 Mils.

F. PVC Pipes, Exterior or Interior Exposure

1. PVC pipes, valves, and accessories, shall receive the following types of paint:

Interior

Application	No.	Product Name	DFT
Finish - 1 coat	66-Color	Hi-Build Epoxoline	4.0 – 6.0

Exterior

Application	**No.**	**Description**	**DFT**
First - 1 coat	66-Color	Hi-Build Epoxoline	2.0 – 3.0
Finish - 1 coat	73-Color	Endura Shield	2.0 – 3.0
		Min. Total	5.0 Mils.

3.04 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 application 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 F 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 F within 18 hours after the application of the paint.

2. No painting shall be performed unless the surface temperature is a minimum of 5 degrees above dew point and the temperature must be maintained for the complete duration of curing.

3. No painting shall be performed on windy days where wind velocities are greater than 5 mph.

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 lapmarks 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.

3.05 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. 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.

3.06 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 the Color Schedule attached to end of this Specification. 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.

2. The titles shall be provided on precut, prefinished plastic signs that are strapped to the pipe and shall identify the contents by complete names at least once in each area through which it passes and thereafter be abbreviated. Titles and abbreviations shall be approved by Engineer during shop drawing review.

3. Title color shall be black or white as directed and shall have an overall height in inches in accordance with Table 09900-2. 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, the Contractor shall furnish and attach corrosion resistant color tags with the required lettering and a band of color painted for its full circumference.

3.07 OSHA SAFETY COLORS

A. Items listed in ANSI 253.1-1971, 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 253.1-1971, 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.

3.08 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.

3.09 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
HEIGHT OF PIPING LETTERING

Diameter of Pipe or Pipe Covering	Height of Lettering
3/4 to 1-1/4 inches	1/2 inch
1-1/2 to 2 inches	3/4 inch
2-1/2 to 6 inches	1-1/4 inches
8 to 10 inches	2-1/2 inches
Over 10 inches	3-1/2 inches

Notes:

1. Letter type shall be Helvetica Medium upper case. The manufacturer's instructions shall be followed in respect to storage, surface preparation and application.

END OF SECTION

DIVISION 11

EQUIPMENT

SECTION 11270
LIME DUST COLLECTOR EQUIPMENT

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish all labor, materials, equipment and services to install a new lime dust collector unit complete and ready for operation. The lime dust collector unit shall be properly sized for the intended operation and shall be roof-mounted as shown on the Drawings. The scope of supply includes a lime dust collector unit equipped with a centrifugal blower, cloth bag filters, bag shaker drive, discharge air lock valve, pre-wired main control panel plus any additional system components necessary to provide a complete and operable lime dust collector unit.

1.02 MANUFACTURER

A. The equipment specified herein shall be the end product of one **dry/bag type** dust collector unit supplier who shall assume complete responsibility for new system components required to perform its intended function in complete conformance with the project specifications. The lime dust collector unit shall be manufactured and assembled by FLSmidth, Inc. (FLSmidth). Substitutions, which in the opinion of the Engineer are determined to be "equal", will be considered. In the event that the Contractor desires to use an alternate dust collector unit, which is acceptable to the Engineer, the Contractor will be solely responsible for **all** costs associated with the supply and install of the alternate unit, including, **but not limited**, to redesign fees, mechanical system components, structural system components, electrical system components, labor costs and ancillary components.

1.03 SUBMITTALS

A. Shop drawings for all items shall be submitted per Section 01300 entitled "Submittals".

1.04 MANUFACTURER'S REPRESENTATIVE

A. The Contractor shall provide for the presence of competent personnel representing the manufacturer of the lime dust collector equipment to check the installation, adjust the settings, place the installation in service and instruct the Owner's personnel in the operation and maintenance thereof. The Engineer shall be given 7 days advance written notice of the desired start-up date and time. A start-up report shall be prepared in accordance with Section 01650 entitled "Facility Startup". The start-up report shall be submitted to and accepted by the Engineer prior to attainment of substantial completion. O&M manuals, which are prepared in accordance with

Section 01300 entitled “Submittals”, shall also be prepared and submitted to the Engineer for approval.

The services of the manufacturer's representative shall be provided for periods stated in the following schedule:

INSTALLATION TRIP (DAYS)	OPERATION STARTUP & TESTING TRIP (DAYS)	TRAINING (DAYS)*
1	1	1

* One full day with up to 3 training sessions shall be provided. Training outline and resume of training personnel shall be provided a minimum of 2 weeks prior to training for Engineer approval.

Any additional time required to achieve successful installation and operation shall be at the expense of the Contractor.

1.05 DATA PLATES

A. Data plates shall be furnished for all equipment. Data plates shall be of stainless steel and be suitably affixed to each component. Data plates shall contain the manufacturer's name, model and type, serial number, design capacity and other pertinent data.

1.06 HARDWARE

A. All machine bolts, nuts and capscrews shall be of the hex head type and shall be furnished in Type 316 stainless steel. Hardware requiring special tools or wrenches shall not be used.

1.07 TOOLS, SUPPLIES AND SPARE PARTS

A. Parts shall be completely identified with a numerical system to facilitate parts inventory, control and stocking. Each part shall be properly identified by a separate number, and those parts which are identical for more than one size unit shall have the same number. The following shall be supplied for all dust collector unit system components:

1. One (1) set of all special tools required for normal operation and maintenance shall be provided.

2. One (1) set of all manufacturer recommended spare parts for each of the lime dust collector unit components.

B. All spare parts shall be properly protected for long periods of storage and packed in containers which are clearly identified with indelible markings as to the contents.

1.08 WARRANTY

A. The lime dust collector unit manufacturer shall warrant all equipment being supplied to the Owner against defects in workmanship and materials for a period of twelve (12) months under normal use, operation and service. The warranty shall commence from the date of acceptance of the final performance testing. The warranty shall be in published form and apply to all equipment.

PART 2 - PRODUCTS

2.01 GENERAL

A. One (1) lime dust collector unit to be roof mounted above the four (4) existing lime storage bins at the City of Lake Worth Water Treatment Plant, as shown on the Drawings. The lime dust collector unit shall be properly sized to collect airborne lime dust during the pneumatic off-loading process. The scope of supply includes a lime dust collector unit equipped with a centrifugal blower, cloth bag filters, bag shaker drive, discharge air lock valve, pre-wired main control panel plus any additional system components necessary to provide a complete and operable lime dust collector unit. The new lime dust collector unit and ancillary components shall be fully assembled and factory tested prior to shipment. The control panel shall be shipped loose for installation at grade as shown on the Drawings. All bolts, nuts, washers and hardware shall be Type 316 stainless steel.

2.02 PERFORMANCE REQUIREMENTS

A. The lime dust collector unit shall be capable of evacuating at least two times the total air conveyance flow rate required to perform pneumatic off-loading of bulk quicklime with a density of 55 lbs./ cu. ft. from grade to a height of approximately 50-ft through 4-inch diameter fill piping.

B. The lime dust collector unit shall be capable of operating at the design conditions and meet the minimum performance criteria specified below:

Minimum Design Flowrate:	1,200 scfm at 7.5” w.c.
Maximum Design Flowrate:	1,600 scfm at 6.9” w.c.
Number of Filter Bags:	16 units
Total Filter Surface Area:	400 sq. ft.
Maximum Filter Loading Rate:	4 scfm / sq. ft.

2.03 LIME DUST COLLECTOR UNIT EQUIPMENT DESCRIPTION

A. The lime dust collector unit supplied and installed shall be a Size 3, Unifilter Model manufactured by FLSmidth or Engineer approved equal. The Contractor is specifically advised that the design was based on the installation of an FLSmidth unit. If the Contractor elects to submit an alternate unit, the Contractor shall be solely responsible for all engineering, permitting and construction fees associated with the changes required to the design to accommodate an alternate, dry-type lime dust collector unit. These costs shall also include, but not be limited to, the costs to modify all inlet and outlet ductwork, dampers, actuators, structural mainframe, electrical and instrumentation and control systems.

B. The unit supplied shall be a "STD" unit with integrated hopper bottom with flange and base support legs. The dust collector unit shall be supplied with a full height access door which provides access to the top and bottom of the filter bags. The standard dust collector unit from the manufacturer is fabricated of minimum 12-gauge sheet steel. The manufacturer shall confirm that the standard unit is capable of meeting the applicable wind load requirements stipulated in the most recent edition of the Florida Building Code (FBC). The manufacturer shall modify the unit as required to meet all applicable FBC requirements. All required modifications shall be completed at no additional cost to the Owner.

C. The dust collector unit shall be supplied with a variable volume, centrifugal fan which is rigidly secured and ducted to the top of the dust collector unit. The fan shall be sized by the manufacturer to meet the performance criteria stipulated in Article 2.02B. The fan shall be driven by a 5 HP, 230/460V, 60 Hz, 3 phase, TEFC motor. The fan and motor shall be properly aligned and direct coupled. The discharge of the fan shall be supplied with an adjustable outlet damper and bird screen fabricated of Type 316 stainless steel expanded metal. The centrifugal fan will be manually energized by the operations staff prior to the lime offloading process. Upon completion of the offloading process, the operator shall de-energize the fan at the main control panel and initiate the bag cleaning/shaking period. The centrifugal fan will be configured to prevent it from operating concurrently with the shaker drive.

D. The dust collector unit shall be supplied with a total of sixteen (16) filter bags which are oriented vertically. Each of the filter bags shall have a minimum surface area of 25-sq. ft. The filter bags shall be manufactured of cloth and be suitable for the intended purpose. The filter units shall be cleaned after each loading cycle by activating an extra heavy-duty shaker drive. The shaker drive shall be driven by a 1/3 HP, 230/460V, 60 Hz, 3 phase, TEFC motor and speed reducer unit. The shaker drive shall be energized by the operations staff upon completion of the lime offloading process or as warranted to perform bag cleaning. The duration of the bag cleaning/shaking process will be determined based on an operator settable timer. The shaker drive will be configured to prevent it from operating concurrently with the centrifugal fan. The dust collector unit shall be supplied from the manufacturer with

an adequate quantity of dicalite to pre-seed the filter bags.

E. The discharge hopper of the dust collector unit shall be supplied with an 8-inch diameter air lock valve which is equipped with a ½ HP, 230/460V, 60 Hz, 3 phase, TEFC motor. The air lock valve shall be of cast iron and steel construction and shall have a four (4) blade rotor. The drive motor shall be coupled to the valve shaft via a chain and sprocket drive arrangement with an OSHA approved coupling guard. The rotor shall have a design speed of 15 RPM. The air lock valve shall be wired so that upon energizing the centrifugal fan the air lock valve modulates to the "CLOSED" position. Conversely, the air lock valve shall modulate to the "OPEN" position upon energizing the bag shaker drive unit in order to allow any lime product to fall by gravity into the lime storage bin(s) during the bag cleaning/shaking period.

2.04 LIME DUST COLLECTOR CONTROL PANEL DESCRIPTION

A. The lime dust collector unit shall be supplied from the manufacturer with a main control panel which will be wall mounted at grade as shown on the Drawings. The control panel shall be a Type 304 stainless steel, NEMA 4X enclosure. The main control panel shall accept a 230/460V, 60 Hz, 3 phase power source and shall be provided with a main disconnect circuit breaker and mechanism.

B. The main control panel shall contain control relays, control and power terminal blocks, emergency pushbuttons and indicating lights. The main control panel shall also be equipped with NEMA style motor starters for the centrifugal fan, shaker drive and discharge air lock valve. Short circuit protection for each motor shall be provided utilizing thermal magnetic circuit breakers. Individual thermal overload protection shall be provided for all systems.

The front of the main control panel shall be provided with a hard-wired "Emergency Stop" pushbutton. The pushbutton shall be illuminated when depressed and shall immediately de-energize all moving components of the lime dust collector unit.

The main control panel shall be completely factory assembled and prewired with terminal strips for making the required field connections. The panel shall be designed and tested in conformance with UL 508. The enclosure shall be UL508 listed and labeled as a completed assembly. All inspections, approvals and modifications required to have the completed panel labeled and listed by UL shall be furnished by, and the responsibility of the Contractor, at no additional cost to the Owner.

The front door of the main control panel shall be provided with the following controls:

1. Panel Power – “ON/OFF” Switch
2. Centrifugal Fan – “ON/OFF” Switch
3. Shaker Drive – “HAND/OFF/AUTO” Switch

The front door of the main control panel shall be provided with run indication and fault indication lights for the following:

1. System Power – ON
2. Centrifugal Fan – Running
3. Shaker Drive – Running
4. Discharge Air Lock Valve - Running

The front door of the main control panel shall be provided with the following alarms:

1. General

All alarms/faults shall be cleared locally by the plant operations staff at the main control panel.

PART 3 - EXECUTION

3.01 GENERAL

A. The lime dust collector unit shall be installed in strict accordance with the manufacturer’s recommendations and the approved shop drawings, and all work shall be performed by experienced personnel in accordance with recommended practices. The lime dust collector unit shall be installed as shown on the Drawings.

3.02 PAINTING

A. The equipment shall be delivered with shop prime and finish coats applied. Any damage to the coatings shall be touched up by the Contractor to the satisfaction of the Engineer.

3.03 FIELD TESTS

A. Functional Test: Functional testing shall be performed for all new lime dust collector unit components including but not limited to the new centrifugal fan, filter bag shaker drive, discharge air lock valve and main control panel. Prior to system start-up, system components shall be inspected for proper alignment, proper connection, and

satisfactory operation. The manufacturer's representative shall inspect the installation, check for lubrication and minor adjustments and provide certification that the system components have been installed in accordance with the manufacturer's recommendations and are ready for operation. The performance testing shall not be initiated until functional testing has been completed and approved, in writing, by the Engineer.

B. Performance Test:

1. Upon completion and approval of the functional testing, the manufacturer shall conduct a performance test during a scheduled lime truck delivery and offloading event to determine the actual system operating conditions and verify that the unit meets the minimum performance requirements. Proposed test procedures shall be developed by the Contractor and dust collector unit manufacturer and submitted to the Engineer for approval.
2. At the Contractor's request, the Owner shall schedule a delivery of lime to the project site. The Contractor shall provide the Owner with at least 7-days advance notice of the proposed date of the final performance test so that the Owner may coordinate with his designated lime supplier.

3. If, after the initial performance test, in the opinion of the Engineer, the system meets the minimum specified performance requirements, the Engineer will recommend to the Owner, in writing, the official acceptance of the lime dust collector unit and associated components. If, in the opinion of the Engineer, the performance test results do not meet the requirements specified herein, the Engineer will notify the Owner and Contractor of the non-acceptance of the performance tests.

4. In the case of non-acceptable performance, the Contractor shall then have seven (7) days in which to perform, at its sole expense, any supplemental testing, equipment adjustments changes or additions. Upon completion of the system adjustments the Contractor shall advise the Engineer and Owner that he is prepared to perform a subsequent performance test. At this time, the Owner will advise the Contractor when the next lime delivery is anticipated to be scheduled based on the current lime usage rates and plant production. The Contractor shall be required to complete successive performance testing, at no cost to the Owner, until such time that the performance tests are determined to be acceptable by the Engineer.

END OF SECTION

SECTION 11300
COAGULANT FEED SYSTEM

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. This Section covers the supply and testing of one (1) completely functional, skid-mounted coagulant feed system. The coagulant feed system shall include one (1) skid assembly containing two (2) metering pumps, all necessary piping, valves, fittings, supports, electrical controls and accessories as shown on the Drawings and specified herein.

1.02 RELATED WORK

A. Section 15000 – Piping

B. Section 06600 – Fabricated Fiberglass

C. Section 01650 – Facility Startup

1.03 QUALITY ASSURANCE

A. The coagulant feed equipment shall be the product of a manufacturer who has designed and manufactured similar skid mounted feed systems and equipment, and has a record of ten years or more of successful operation of such equipment in the field. All pumps and components shall be pre-assembled onto the skid-mounted system by the skid manufacturer and shop-tested for capacity and pressure prior to shipment with documented results submitted, in writing, to the Engineer for approval.

1.04 WARRANTY

A. The coagulant metering pump manufacturer shall provide a two-year warranty on the metering pump mechanical drive and a one-year warranty on the liquid end, pump accessories, and the skid-mounted system. The warranty shall be inclusive liquid leakage from the pumps and/or piping systems.

1.05 SUBMITTALS

A. Shop drawings shall be submitted in accordance with Section 01300 entitled "Submittals". Shop drawings shall include the following, at a minimum: Manufacturers literature, illustration, specifications and engineering data including: dimensions, materials, size, weight, performance data, flow rate, motor horsepower (or current draw) and speed.

B. Operations and Maintenance Manuals

PART 2 - PRODUCTS

2.01 GENERAL

A. Pump Manufacturer:

1. ProMinent Fluid Controls, Inc.

2. Engineer approved equal.

B. Skid Manufacturer:

1. ProMinent Fluid Controls, Inc.

2. Engineer approved equal.

2.03 SOLENOID-ACUATED METERING PUMP

A. The coagulant metering pumps shall be microprocessor-controlled, simplex, solenoid-driven, reciprocating, diaphragm type. All pumping functions shall be set by membrane-switch keypad and status shall be displayed on an illuminated LCD, which is readable at an offset angle of 45-degrees. Keypad shall allow for simple scrolling and display of programmed parameters. The housing shall be fabricated of fiberglass reinforced polypropylene and be rated in accordance with the requirements of NEMA 4X and IP 65.

1. Pump Operating Design Criteria:

a. Quantity:	Two (2), One Duty/One Standby
b. Type of Coagulant:	Med. charge anionic polyacrylamide
c. Minimum Capacity:	0.27 gph
d. Maximum Capacity:	3.44 gph
e. Estimated Backpressure:	20 psig, maximum

B. The power supply shall be 120-volt, 60 Hz, single phase. The microprocessor is to automatically compensate for supply voltage variations within 15% of the rated voltage such that the frequency of the pump remains constant.

C. Liquid End: The liquid end shall be PVDF with PTFE seals, with built-in coarse valve and needle valve for air bleed, manually adjusted for continuous degassing of process fluid and self-priming against pressure. The suction and discharge valves shall be of the double ball check design. The liquid end shall be physically separated from the drive unit by a backplate with weep hole creating an air gap. An elastomer shaft wiper seal shall prevent contamination of the solenoid if the primary diaphragm fails. The diaphragm shall be constructed of a steel core, vulcanized into nylon-reinforced EPDM, with PTFE-faced fluid contact surface.

D. Programming and Control

1. Stroke length control shall be manually adjusted between 0% and 100% with a stroke adjustment knob on the pump face control. The LCD shall digitally display stroke length setting in 1% increments in the full range of 0-100%.

2. Programming shall allow pump to be calibrated so as to display pump output in gallons/hour or liters/hour. Calibration shall be maintained when stroke length is altered up to plus or minus 10% on the stroke length knob. If stroke length is altered by more than 10%, a yellow warning light will light and a flashing message will appear.

3. The pump shall be equipped with the programmable function of pressure levels to allow pump to operate at reduced pressures from the maximum rated pressure of the pump.

4. The pump shall be equipped with the programmable function of electronic interlocking of the keypad by access code to prevent unauthorized adjustments to the pump.

5. Keypad shall allow for scrolling and display of specific parameters including stroke frequency, stroke length, stroke counter, pump output in gals/hr or L/hr, dosing quantity, mA current input being received by pump, and indication of external mode.

6. Stroke frequency control shall be manually adjusted by touch keypads, with the set stroke rate displayed on the LCD screen. The metering pump shall be capable of receiving a pulse input via optional external control cable such that one pulse gives one pump stroke rate. The pump shall be capable of remote ON-OFF operation using the pause function via a voltage free contact relay through a control cable.

7. The pump shall accept an analog signal such that stroke frequency is proportional to 0/4-20mA or 20-4/0mA, the choice of which is programmable at the pump. The pump shall allow the setting of a maximum stroke rate, which corresponds to the maximum analog signal, with stroke rate proportional to signal strength below that rate. Programming for curve processing shall also be possible, in which any stroke frequency ratio in proportion to the electrical signal can be configured. Analog to digital converters external to the pump shall not be allowed.

8. The pump shall be equipped with the programmable function of auxiliary frequency control, allowing for quick priming of the pump or for slug feed after system shutdown. Stroke frequency shall be programmable to a maximum of 180 spm, and the auxiliary frequency function shall be capable of interfacing with a contact closure relay for control purposes.

E. Accessories

1. A control cable with 5-pole round plastic connector and 5-wire cable with loose ends shall be provided with each pump.

2. A two-stage float switch compatible with the chemical to be used shall be provide with each pump to monitor the level in the coagulant mixing station tank.

3. A diaphragm failure detector shall be provided at each pump to close a contact for alarm in the event of a diaphragm failure.

2.04 SKID-MOUNTED FEED SYSTEM

A. The skid mounting of the metering pumps shall conform to the following requirements:

1. The coagulant feed system shall be completely shop assembled, mounted, calibrated, tested, and delivered to the site on a single skid. Components to be mounted on the skid are as indicated on the Drawings and shall include the metering pumps, calibration column, piping, valves, piping accessories (pulsation dampeners, strainers, back pressure valves, pressure relief valves, etc.), and wiring integral to the skid. The coagulant metering pump manufacturer shall be responsible for providing all equipment, valves and piping within the skid boundary.

2. The skids shall be constructed of fusion welded polypropylene sheets with adequate supports for all equipment and piping and a ½" drip lip. Forklift truck cut outs and/or lifting lugs shall also be provided.

B. Skid-mounted accessories to include the following:

1. Calibration Chamber:

a. Provide one, clear plastic calibration chamber with vent for use in calibrating the metering pumps.

b. The chamber shall be sized to give adequate capacity for a minimum 30-second draw down test.

c. The scale shall give direct readings in mL and GPH without the need for calculations.

d. The calibration chamber shall be piped and valved so that each pump shall be able to utilize the calibration chamber without interfering with the operation of the other pumps.

e. The top of the chamber shall have a threaded fitting to allow for piping to a common vent.

2. Pulsation Dampeners:

a. Shall be of the single diaphragm design, capable of arresting water hammer in the pump discharge lines created by the metering pumps.

b. Materials of construction of diaphragm and body shall be corrosion resistant to the chemical fluid pumped.

c. Provide one dampener on the discharge side of each metering pump.

d. Each pulsation dampener shall include an integral pressure gauge.

e. Pulsation dampeners shall be sized appropriately for each pump to remove a minimum of 95% of the pulsations. The manufacturer shall provide calculations to verify sizing if requested by the Engineer.

3. Backpressure and Pressure Relief Valves

a. Adjustable diaphragm backpressure sustaining type valve installed on pump discharge header and set at location recommended by manufacturer. Materials to be suitable for rated chemical service.

b. Adjustable diaphragm pressure relief valve installed externally on pump discharge header and set at location recommended by manufacturer. PRV required for each pump mounted on feed system. Materials to be suitable for respective chemical service.

4. Coagulant Carrier Fluid Rotameter

a. An adjustable rotameter shall be supplied to provide flow control of the potable water to be used for the coagulant carrier fluid as shown on the Drawings. The rotameter shall be calibrated for the fluid being metered and shall be scaled in gallons per minute (i.e. gpm). The rotameter body shall be fabricated of polycarbonate and the meter shall have a needle valve with an adjustable knob. The rotameter shall have a minimum working pressure of 100-psi. The rotameter shall have a minimum flowrate scale of 0 to 5 gpm, with minimum 0.25 gpm increments. The rotameter shall come complete with suitable, non-corroding mounting assemblies and

hardware. The rotameter shall be rigidly supported/secured using PVC and/or Type 316 stainless steel supports. The rotameter shall be the Rate Master® Series manufactured by Dwyer Instruments, Inc. or Engineer approved equal.

4. Piping, Valves and Appurtenances:

a. Skid piping shall be Schedule 80 PVC. Cement shall be as recommended by the pipe manufacturer for the service outlined in this Section.

b. True-union ball valves shall be provided for isolation of major equipment. Seals shall be compatible with the chemical being pumped.

PART 3 – EXECUTION

3.01 SHIPPING, HANDLING, DELIVERY AND STORAGE

A. Packaging: The skid manufacturer shall properly prepare and package the entire coagulant feed system in advance of shipping. The coagulant feed system shall be shipped, fully assembled, as a complete unit. Field fabrication and assembly onsite will not be permitted. The Contractor is to assume responsibility for packaging to prevent damage during site storage

3.02 INSTALLATION

A. The Contractor shall furnish the services of competent factory representative familiar with this installation and equipment to supervise installation, start-up and testing.

B. All materials and equipment shall be clean and free of oil, grease and/or chemical contaminations prior to installation.

3.03 START UP AND TRAINING

A. Start up and training by coagulant feed equipment factory representative(s) shall be coordinated and supplied by the Contractor, at no additional cost. The Manufacturer's representative shall provide the service for successful equipment start-up and operations personnel training.

END OF SECTION

DIVISION 13

SPECIAL CONSTRUCTION

SECTION 13300
SLAKER SUBPANEL

PART 1 - GENERAL

1.01. SCOPE OF WORK

A. Work includes engineering, furnishing, installing, testing, documenting and placing in operation A SUB PANEL and associated appurtenances for the city of Lake Worth Water Treatment Plant.

B. The Control Diagrams and One Line Diagrams and these Specifications depict the minimum functional requirements of the control system provided under this section. The CONTRACTOR shall provide all materials, labor and controls necessary to provide a safe and operable system. The specific control system proposed shall be subject to the approval of the OWNER.

C. See Division 1, Division 11 and Division 16.

D. The CONTRACTOR shall provide the system programming. Data to be exchanged with the SCADA central site.

E. The CONTRACTOR will perform any work at the SCADA master site needed to incorporate the Improvements into the system, including but not limited to screen development and programming.

F. The Sub-panel shall be a wall mounted NEMA 4X 316 stainless steel enclosure containing a DC Controller, relays and control transformer that provides monitoring and control functions.

G. It is the ultimate responsibility of the CONTRACTOR to furnish a complete sub-panel that fully meets the requirements set forth herein and as shown on the Contract Drawings. A single entity (henceforth referred to as the SYSTEM SUPPLIER) shall be retained by the CONTRACTOR to have overall responsibility for designing, furnishing, interfacing, adjusting, testing and documenting the PCP equipment described in the Contract Documents.

H. The work defined in this Specification Section shall be performed by one of the following listed below and henceforth referred to as the SYSTEM SUPPLIER.

1. CC Control Corp.
   5760 Corporate Way
   West Palm Beach, FL 33407
   561-688-9075

2. Owner approved equal

I. The CONTRACTOR shall be responsible for:

1. Equipment storage and protection until installed following the storage and handling instructions recommended by the SYSTEM SUPPLIER. Anti-static and winterization requirements shall be per the SYSTEM SUPPLIER's instructions and the SYSTEM SUPPLIER shall periodically verify that these instructions are followed.

2. Included within the Electrical Subcontractor's scope of work is the provision, installation and termination of field and power wiring to the PCP. Termination shall be made in accordance with final accepted interconnection diagrams developed by the SYSTEM SUPPLIER. The Electrical Subcontractor shall mark on the interconnect diagram the field wire numbers used for each termination point. The SYSTEM SUPPLIER shall finalize the interconnect diagrams by including these field wire numbers in the final as built version.

3. The CONTRACTOR shall require the SYSTEM SUPPLIER to observe and advise on the installation of the PCP to the extent required to certify that the equipment will perform as required.

J. All engineering development required by the SYSTEM SUPPLIER will be in accordance with the Conditions of this Contract.

K. Equipment found to be defective prior to system acceptance shall be replaced and installed at no additional cost to the OWNER.

L. In the bid price, the SYSTEM SUPPLIER shall provide for obtaining the services of authorized field personnel from the manufacturer’s of components or systems provided under this section but not manufactured by the SYSTEM SUPPLIER. Should these personnel be required during installation and checkout of the PCP, such services shall be provided at no additional cost to the OWNER.

M. Refer to the contract drawings wiring diagrams.

1.02. RELATED WORK

A. All mechanical installation of field instruments is performed under Division 11.

B. All conduits, power and field wiring and cables are provided and installed under Division 16.

1.03. SUBMITTALS

A. Furnish, as prescribed under the General Requirements, all required submittals covering the items included under this section and its associated sections of the work.

B. Submit complete, neat, orderly, and indexed submittal packages. Handwritten diagrams are not acceptable and all documentation submittals shall be made using CADD generated utilities.

C. Partial submittals or submittals that do not contain sufficient information for complete review or are unclear will not be reviewed and will be returned by the ENGINEER as not approved.

D. Provide all shop drawing submittals on disk in PDF format.

E. Submit the following Field Instrumentation Shop Drawings in a single package:

1. Catalog information, descriptive literature, wiring diagrams, and shop drawings on all components of the field instruments, including all miscellaneous electrical and mechanical devices furnished under this section.

2. Complete part numbers for all instruments, including any options, shall be identified. Provide manufacturer's data that correlates to the complete part number.

3. Individual data sheets for all components of the field instruments to supplement the above information by citing all specific features for each specific component (e.g. scale range, materials of construction, special options included, etc.). Each component data sheet shall bear the component name and instrument tag number designation shown in the Drawings and Specifications.

4. Installation details for all field mounted devices to show conformance with the Contract Documents.

5. Configuration documentation for all programmable devices to indicate actual settings used to set the device scale, range, trip points, and other control parameters.

F. Provide a single PCP shop drawing submittal containing the following:

1. Loop diagrams, consisting of complete wiring and/or plumbing diagrams for each control loop showing all terminal numbers, the location of the dc power supply, the location of any booster relays or common dropping resistors, surge arrestors, etc. The loop diagrams shall meet the minimum

requirements of ISA S5.4 plus divide each loop diagram into four areas for identification of element locations: PLC I/O point(s), panel face, back-of-panel, and field, respectively.

2. System interconnect diagram that shows all connections required between component parts of the items covered in this section and between the various other systems specified in this Contract. Number all electrical terminal blocks and field wiring. Identify each line at each termination point with the same number. Do not use this number again for any other purpose in the complete control scheme.

3. Panel Layout Drawings and Bill of Materials: An internal layout of all panels cross-referenced to a list of all components. Group components by type and include component model number and part number, component description, quantity supplied, and reference to component catalog information.

4. Descriptive Information: Catalog information, descriptive literature, performance specifications, internal wiring diagrams, power and grounding requirements, power consumption, and heat dissipation of all elements. Clearly mark all options and features proposed for this project.

5. Installation Details. Equipment installation drawings showing external dimensions, enclosure material and spacing, mounting connections, and installation requirements.

6. A list of, and descriptive literature for, spares, expendables, and test equipment.

G. Test Procedures: Submit the procedures proposed to be followed during all system testing. Procedures shall include test descriptions, forms, and check lists to be used to control and document the required tests.

H. Test Reports: Upon completion of each required test, document the test by submitting a copy of the signed off test procedures to the ENGINEER.

1.04. FINAL DOCUMENTATION

A. After the demonstration tests have been completed and as a part of the final acceptance requirements, submit the PCP record drawings. Record drawings shall include, corrected for any changes that may have been made up through Substantial Completion:

1. instrument loop wiring diagrams

2. panel wiring diagrams

3. panel elevations

4. interconnection diagrams showing terminal numbers at each wiring termination

B. Record drawings shall be developed or converted to the latest version of AutoCAD. Provide two copies of all AutoCAD files on separate Compact Disks.

C. Operating and Maintenance (O&M) Manuals: Provide the specified number of complete sets of three-ring bound O&M manuals in accordance with Division 1. Include descriptive material, drawings, and figures bound in appropriate places. Include:

1. Cross references to 3rd party O&M manuals.

2. Additional operating and maintenance instructions in sufficient detail to facilitate the operation, removal, installation, adjustment, calibration and maintenance of each component provided with the PCP.

3. All the submittal data for each component from the approved shop drawing submittals with corrections made on approved as noted items.

4. A Compact Disk containing the shop drawing data in PDF format in the binder sleeve.

1.05. QUALITY CONTROL

A. The SYSTEM SUPPLIER shall be subcontracted by and paid by the CONTRACTOR.

B. The SYSTEM SUPPLIER shall meet all of the requirements of these specifications, and, unless specifically stated otherwise, no prior acceptance of any subsystem, equipment, or materials has been made.

C. All equipment furnished by the SYSTEM SUPPLIER shall be of the latest and most recent design and shall have overall accuracy as guaranteed by the manufacturer.

D. Materials and equipment used shall be U.L. approved wherever such approved equipment and materials are available.

E. Component equipment shall be as supplied by one of the manufacturers named or approved equal. The design of the PCP is based on the first-named manufacturer's equipment if there is a difference.

F. To facilitate the OWNER's operation and maintenance, products shall be of the same major MANUFACTURER, with panel mounted devices of the same type and model as far as possible.

G. In order to insure the interchangeability of parts and the maintenance of quality, strict compliance with the above requirements shall be maintained.

H. The SYSTEM SUPPLIER shall designate a single point of contact for interface with the ENGINEER on this project. The ENGINEER reserves the sole right to approve or reject this point of contact.

I. The SYSTEM SUPPLIER shall provide experienced personnel on-site to coordinate and/or perform installation, termination, and adjustment; on-site testing; OWNER training; and startup assistance for the PCP.

1.06. STANDARDS

A. The design, testing, assembly, and methods of installation of the wiring materials, electrical equipment and accessories proposed under this Contract shall conform to the National Electrical Code and to applicable state and local requirements. UL listing and labeling shall be adhered to under this Contract.

B. International Society of Automation (ISA) and National Electrical Manufacturers Association (NEMA) standards shall be used where applicable in the design of the PCP.

C. Any equipment that does not have a UL, FM CSA, or other approved testing laboratory label shall be furnished with a notarized letter signed by the supplier stating that the equipment famished has been manufactured in accordance with the National Electric Code and OSHA requirements.

D. Any additional work needed resulting from any deviation from codes or local requirements shall be at no additional cost to the OWNER.

1.07. WARRANTY AND GUARANTEES

A. In accordance with Division 1, the SYSTEM SUPPLIER shall furnish to the OWNER a written two year guarantee commencing with substantial completion, that all equipment and parts thereof, material and/or workmanship are of top quality and free from defects.

B. The SYSTEM SUPPLIER shall guarantee all equipment whether or not of his own manufacture.

PART 2 - PRODUCTS

2.01. GENERAL REQUIREMENTS

A. Equipment to be installed in a hazardous area shall meet Class, Group, and Division classification as shown on the Contract Electrical Drawings, or comply with the local or National Electrical Code, whichever is the most stringent

requirement.

B. All instruments requiring plumbing shall utilize 316 stainless steel components as follows:

1. Test Tap: Shall consist of Crawford Fitting Co. Swagelock quick connects Series QC4-DE, no equal.

2. Tubing, Stainless Steel: Shall be ASTM A 312, TP 316, seamless, soft annealed with 0.065 inch wall. Fittings shall be ASTM A 276, TP 316 compression or socket weld type.

3. Valve, Ball: Shall be stainless steel ball valves, Whitey Series 40, Hoke Flamite Series 7100, or equal.

C. All instrumentation supplied shall be of the MANUFACTURER's latest design and shall produce or be activated by signals, which are established standards for the water and wastewater industries.

D. All electronic instrumentation shall be of the solid-state type and shall utilize linear transmission signals of 4 to 20 mA DC (milliampere direct current); however, signals between instruments within the same panel or cabinet may be 1-5 volts DC (direct current). Outputs of equipment that are not of the standard signals as outlined, shall have the output immediately raised and/or converted to compatible standard signals for remote transmission. No zero based signals will be allowed.

E. All instruments shall be provided with mounting hardware and floor stands, wall brackets, or instrument racks.

F. All transmitters shall be provided with either integral indicators or conduit mounted indicators in process units, accurate to two percent. Indicator readouts shall be linear in process units.

G. Electronic equipment shall utilize printed circuitry suitably coated to prevent contamination by dust, moisture and fungus. Solid-state components shall be conservatively rated for their purpose, to assure optimum long-term performance and dependability over ambient atmosphere fluctuations and 0 to 100 percent relative humidity. The field mounted equipment and system components shall be designed for installation in dusty, humid, and slightly corrosive service conditions.

H. All equipment shall be designed to operate on a 60-Hertz alternating current power source at a normal 120 volts, plus or minus 10 percent, except where specifically noted. All regulators and power supplies required for compliance with the above shall be provided between power supply and interconnected

instrument loop. Where equipment requires voltage regulation, constant voltage transformers shall be supplied.

I. All equipment, cabinets and devices furnished hereunder shall be heavy-duty type, designed for continuous industrial service. The system shall contain products of a single MANUFACTURER, insofar as possible, and shall consist of equipment models which are currently in production. All equipment provided shall be of modular construction and shall be capable of field expansion through the installation of plug-in circuit cards or additional cabinets.

J. The equipment furnished shall be designed to operate satisfactorily between 0 degrees C and 40 degrees C at up to 95 percent Relative Humidity (non condensing).

K. All switches shall have double-pole, double-throw contacts rated at a minimum of 600 volts-amperes (VA), unless specifically noted otherwise.

L. All equipment shall be designed and constructed so that in the event of a power interruption, the equipment specified hereunder shall resume normal operation without manual resetting when power is restored.

2.02. LIGHTNING/SURGE PROTECTION

A. Surge suppressors and arrestors meeting the requirements of ANSI Standard C-62.41 (latest revision) shall be provided as further detailed below.

B. Single phase AC Power (to 15Amps). Lightning and surge protectors for AC power supply lines up to 15 Amps service shall meet the following criteria:

1. Serial protection with replaceable fuse.

2. Failure indicator

3. Response time of less than five nanoseconds.

4. Capable of withstanding up to 10,000 Amps at IEEE/ANSI C-62.41 8 x 20 microseconds combination wave.

5. Manufacturer/model:

a. EDCO HSP121BT

b. MTL Series MA15

C. Single phase AC Power (over 15Amps). Lightning and surge protectors for AC power supply lines over 15 Amps service shall meet the following criteria:

1. Parallel protection using MOVs and thermal fusing technology.

2. Failure indicator

3. Response time of less than five nanoseconds.

4. Capable of withstanding up to 6,500 Amps at IEEE/ANSI C-62.41 8 x 20 microseconds combination wave.

5. Manufacturer/model:

   a. EDCO FAS-120AC

   b. Approved equal.

D. AC Powered Instruments. Lightning and surge protection shall be provided on both the AC power supply and signal lines. The protectors and the instrument/transmitter shall be mounted together with a circuit breaker on a pole-mounted stainless steel plate. The protectors shall meet the following criteria:

1. NEMA 3R small case, conduit mounted enclosure.

2. Response time of less than five nanoseconds.

3. AC Power protection: IEEE/ANSI Std. C-62.41 rated C3 at 330 Volts clamping level.

4. Signal line protection: 10,000 Amp 8 x 20 microsecond surge, clamped at 36 Volts clamping level.

5. Test jacks for low level signal monitoring.

6. Manufacturer/model:

   a. EDCO SLAC series.

   b. Approved equal.

E. Loop Powered Instruments. Lightning and surge protection shall be provided on the 4-20 mA DC signal line. The protectors shall meet the following criteria:

1. Encapsulated in Stainless Steel Pipe nipples for in-line conduit mounting.

2. Response time of less than one nanosecond.

3. Capable of withstanding up to 400 occurrences of 500 Amps at 10 x 1 millisecond.

4. Series resistance of 5 ohms per line.

5. Protection of both lines plus shield.

6. Manufacturer/model: EDCO SS65 or approved equal.

7. All discrete output signals shall be equipped with interposing relays to electrically isolate them from the control system I/O.

2.03. VOLUMETRIC LIME FEEDER EQUIPMENT DESCRIPTION

A. The volumetric lime feeder unit to be supplied and installed shall be a Model 25-12, low to medium capacity, screw type feeder manufactured by MERRICK. The unit shall have a minimum capacity of 28 cu. ft. /hr. and a minimum turndown ratio of 50:1 for a corresponding turndown capacity of 0.56 cu. ft. /hr. The feeder shall have a repeatable accuracy of +/- 1.0% by volume and +/- 3.0% by weight.

B. The feeder unit shall be constructed of carbon steel. The base and ends of the unit shall be fabricated of 11-gauge steel sheet. The hopper section of the unit shall be fabricated of 14-gauge steel sheet. The feeder shall be equipped with a minimum 1.0 cu. ft. integral hopper. All carbon steel surfaces shall be factory prepped, primed and painted with an epoxy based protective coating system.

C. The volumetric feeder shall be supplied with a 3-inch diameter, open spiral helix, progressive pitch auger. The auger shall be fabricated of Type 316 stainless steel. The discharge of the feeder shall be equipped with a 5-inch diameter carbon steel spout.

D. The lime feeder auger shall be driven by a pulse width modulated (PWM) direct current (DC) motor controller and ¼ HP, 90V DC motor which is directly coupled via a dual range gear reducer. The motor controller shall be supplied by MERRICK and shall have a single, one turn, and 0-100% potentiometer for speed control. The controller shall be provided with local and remote running capabilities with a signal isolator board for external (i.e. remote) feeder control. The controller shall be provided in a NEMA 4X FRP enclosure with an emergency start-stop switch mounted to the face of the panel. In addition to remote speed control, run indication and fault status indication shall be capable through the existing plant SCADA system.

2.04. CONTROL PANEL REQUIREMENTS

A. General:

1. All conduit entry shall be from the side or bottom only.

2. The panel shall be provided with an isolated copper grounding bus to ground all signal shield connections.

3. The panel shall be equipped with an internal, hand-switch controlled, 40-watt fluorescent light and 120V, 15 amp, duplex utility receptacle. These shall be serviced through a dedicated breaker.

4. The panel shall be protected from internal corrosion by the use of corrosion – inhibiting vapor capsules. Provide:

   a. Northern Instruments Model Zerust VC-6-2

   b. Hoffman, model A-HC15E

   c. Approved equal.

B. Finish:

1. All front panel openings for panel-mounted equipment shall be cut with counter-boring and provided with trim strips as required to give a neat finished appearance.

2. All steel panel surfaces shall be treated with phosphatized treatment inside and out, and then finished on the exterior with two coats of baked enamel of the approved color. Interiors of panels shall be white, ANSI No. 51.

C. Doors:

1. All control panels shall have a continuous piano hinge door for ease of access. A minimum of 80% of the panel interior shall be exposed by doors.

2. The inside of each door shall be equipped with a print pocket.

3. Two-door enclosures shall have a removable center post.

D. Nameplates:

1. All front-face panel mounted controls shall be equipped with screw mounted laminated plastic nameplates to completely define their use. The use of adhesive to mount front panel nameplates will not be acceptable.

2. All internal components shall be equipped with identification tags

E. Electrical:

1. Main circuit breaker and branch circuit breaker for each branch circuit as required to distribute power from the main power feed.

2. All breakers accessible when the panel door is open.

3. No more than 20 devices on any single circuit.

4. No more than 12 amps for any branch circuit.

5. Panel (or site) lighting, receptacles, heaters, controls, telemetry and fans on separate branch circuits.

F. Wiring:

1. Power wiring shall be 300 volt, type THWN stranded copper, No. 14 AWG size, for 120V service.

2. Discrete wiring shall be 300-volt type THWN stranded copper, sized for the current carried, but not smaller than No. 16 AWG.

3. Analog signal wiring shall be 300 volt, stranded copper in twisted shield pairs, no smaller than No. 16 AWG.

4. Panel wiring shall be routed within wire troughs or panduits.

5. Hinge wiring shall be secured at each end with the bend portion protected by a plastic sleeve.

6. Analog or dc wiring shall be separated from any ac power or control wiring by at least six inches.

7. Each wire shall be uniquely identified at all terminations using machine printed plastic sleeves

G. Terminal blocks shall be provided for all field wiring entering the panel. The greater of 4 or 15% spare terminal blocks shall be provided.

1. No more than one wire per field termination point.

2. Terminal block shall be provided for PLC I/O. PLC I/O shall be wired to the terminal block.

H. Construction:

1. Minimum metal thickness: 14-gauge.

2. Stiffeners as required to prevent deflection under instrument loading and permit lifting without racking or distortion.

3. When required, removable lifting rings and fill plugs to replace rings after installation.

4. All components and terminals shall be accessible without removing other components except for covers.

I. The panel shall be a manufactured item, Hoffman Engineering, or equal.

2.05. PANEL DEVICES

A. Selector Switch. Units shall meet the following:

1. Heavy-duty, oil-tight, industrial type selector switches rated for NEMA 4 service.

2. Contacts rated for 120-volt ac service at 10 amperes continuous.

3. Number of positions and contact arrangements as required.

4. Factory-engraved legend plate indicating position definition.

5. Panel mounting accommodating panel thickness between 1/16 to ¼ inch.

6. Black knob type operator.

7. Square D Class 9001, Type K; Cutler Hammer Type CH1025 or equal.

B. Pushbutton. Units shall meet the following:

1. Heavy-duty, oil-tight, industrial type push buttons rated for NEMA 4 service.

2. Contacts rated for 120-volt ac service at 10 amperes continuous.

3. Number of positions and contact arrangements as required.

4. Factory-engraved legend plate indicating function.

5. Panel mounting accommodating panel thickness between 1/16 to ¼ inch.

6. Operator: Red extended head for STOP, green flush head for START, black flush head for other functions.

7. Square D Class 9001, Type K; Allen-Bradley type 800T, or equal.

C. Indicating Light. Units shall meet the following:

1. Heavy-duty, oil-tight, push-to-test industrial type with integral transformer for 120V AC application.

2. Rated for NEMA 4 service.

3. Screwed on flat-faced lenses in colors shown on the drawings.

4. Factory-engraved legend plates.

5. Square D type K, Allen-Bradley Type 800T, or approved equal.

D. Control/Interposing Relays: All relays shall meet the following:

1. Compact, general-purpose, plug-in type.

2. Socket mounted.

3. Contacts rated for not less than 10 amperes at 120V.

4. Equipped with neon status lights and test buttons.

5. Permanent, legible identification.

6. Potter & Brumfield series KRPA or approved equal.

E. Time Delay Relay. Time delay relays shall meet the following:

1. Available functions: On delay, Off delay, or one shot.

2. Socket mounted.

3. Knob adjustment.

4. Contacts rated for not less than 10 amperes at 120V.

5. Timing range as appropriate for the application.

6. Magnecraft series W211 or approved equal.

F. Terminal Blocks. Terminal blocks shall meet the following requirements:

1. Screw terminals capable of accepting 10-26 AWG wire.

2. Fused disconnect style.

3. DIN-rail mounting.

4. Connectors shall be either copper or steel. Use of aluminum connectors shall not be permitted without prior approval of the Engineer.

5. Phoenix Contact UT4 HES1 or approved equal.

2.06. SPARES AND EXPENDABLES

A. Provide the following spare parts:

1. One spare d.c. power supply of each type provided.

2. Five percent (rounded up) spare relays of each type provided.

3. Five percent (rounded up) spare surge suppressors of each type provided.

B. Provide the following expendables:

1. Two year supply of corrosion inhibitor capsules

2. Ten percent (rounded up) spare fuses (minimum of 10) of each type and rating supplied.

PART 3 - EXECUTION

3.01. GENERAL

A. Prerequisite Activities and Lead Times: Do not start the following key project activities until the listed prerequisite activities have been completed and lead times have been satisfied:

B. Hardware Purchasing, Fabrication, and Assembly: Associated design related submittals completed (no exceptions, or approved as noted).

C. Shipment: Completion and approval of all design related submittals.

D. The PCP shall be assembled as far as possible at the SYSTEM SUPPLIER's shop. No work, other than correction of minor defects or minor transit damage, shall be done on the panels at the jobsite.

3.02. PRODUCT HANDLING

A. Adequately pack manufactured material to prevent damage during shipping, handling, storage and erection. Pack all material shipped to the project site in a container properly marked for identification. Use blocks and padding to prevent movement.

B. Ship materials that must be handled with the aid of mechanical tools in wood-framed crates.

C. Ship all materials to the project site with at least one layer of plastic wrapping or other approved means to make it weatherproof. Anti-stat protection shall be provided for all sensitive equipment.

D. Inspect the material prior to removing it from the carrier. Do not unwrap equipment until it is ready to be installed. If any damage is observed, immediately notify the carrier so that a claim can be made. If no such notice is given, the material shall be assumed to be in undamaged condition, and any subsequent damage that is discovered shall be repaired and replaced at no additional expense to the OWNER.

E. Store and protect equipment until installation following the storage and handling instructions recommended by the equipment manufacturers. Place special emphasis on proper anti-static protection of sensitive equipment.

F. ESD Protection: Provide for the proper handling, storage, and environmental conditions required for the PCP components deemed static sensitive by the equipment manufacturer. Utilize anti-stat wrist straps and matting during installation of these items to prevent component degradation.

G. Protection During Construction: Throughout this Contract, provide protection for materials and equipment against loss or damage and from the effects of weather. Prior to installation, store items in indoor, dry locations. Provide heating in storage areas for items subject to corrosion under damp conditions. Provide covers for panels and other elements that may be exposed to dusty construction environments. Specific storage requirements shall be in accordance with the SYSTEM SUPPLIER's recommendations.

H. Corrosion Protection: Protect all consoles, panels, enclosures, and other equipment containing electrical or instrumentation and control devices, including spare parts, from corrosion through the use of corrosion-inhibiting vapor capsules. Prior to shipment, include capsules in the shipping containers, and equipment as recommended by the capsule manufacturer. During the construction period, periodically replace the capsules in accordance with the capsule manufacturer's recommendations. Replace all capsules just prior to Final Acceptance.

I. The CONTRACTOR shall be responsible for any damage charges resulting from the handling of the materials.

3.03. INSTALLATION

A. Install the PCP in the location indicated on the Drawings and follow manufacturers' installation instructions explicitly, unless otherwise indicated. Wherever any conflict arises between manufacturers' instruction, and these Contract Documents, follow ENGINEER's decision, at no additional cost. Keep a copy of manufacturers' instructions on the jobsite available for review at all times

B. Install materials and equipment in a workmanlike manner utilizing craftsmen skilled in the particular trade. Provide work which has a neat and finished appearance. Coordinate I&C work with the OWNER and work of other trades to

avoid conflicts, errors, delays, and unnecessary interference with operation of the existing plant during construction.

C. Provide finish on instruments and accessories that protects against corrosion by the elements in the environment in which they are to be installed. Finish both the interior and exterior of enclosures. Provide extra paint of each color used in the material from the manufacturer for touch-up purposes.

D. Keep the premises free from accumulation of waste material or rubbish. Upon completion of work, remove materials, scraps, and debris from premises and from interior and exterior of all devices and equipment. Touch-up scratches, scrapes, or chips in interior and exterior surfaces of devices and equipment with finishes matching as nearly as possible the type, color, consistency, and type of surface of the original finish. Clean and polish the exterior of all panels and enclosures upon the completion of the demonstration tests.

E. Ground each analog signal shield on one end at the receiver end only. Properly ground all surge and transient protection devices. Coordinate grounding system with Division 16, Electrical.

F. For the purposes of uniformity and conformance to industry standard, provide analog signal transmission modes of electronic 4-20 ma DC. No other signal characteristics are acceptable.

G. Fully isolate outputs for transmitted electronic signals between transmitters and receivers, equipment of different manufacturers and between control panels to conform to ISA Standard S 50. 1.

3.04. TRAINING

A. The cost of training programs to be conducted with OWNER's personnel shall be included in the Contract price.

B. All training schedules shall be coordinated with, and at the convenience of the OWNER. Shift training may be required to correspond to the OWNER's working schedule.

C. Provide a minimum of eight hours training for up to three of the OWNER’s personnel in the maintenance of the field instruments which shall include:

1. Training in standard hardware maintenance for the equipment provided.

2. Test, adjustment, and calibration procedures.

3. Troubleshooting and diagnosis.

4. Component removal and replacement.

5. Periodic maintenance.

3.05. TESTING

A. As a minimum, the testing shall include shop tests and operational check-out test.

B. Each test shall be in the cause and effect format. The person conducting the test shall initiate an input (cause) and, upon the system producing the correct result (effect), the specific test requirements will have been satisfied.

C. All tests shall be conducted in accordance with, and documented on, prior approved procedures, forms, and checklists. Each specific test to be performed shall be described and a space provided after it for signoff by the appropriate party after its satisfactory completion. Copies of these signoff test procedures, forms, and checklists will constitute the required test documentation.

D. Provide all special testing materials and equipment.

E. The SYSTEM SUPPLIER shall coordinate all of their testing with the CONTRACTOR, the ENGINEER, all affected suppliers, and the OWNER.

F. The ENGINEER reserves the right to test or retest any and all specified functions whether or not explicitly stated in the approved test procedures. The ENGINEER's decision shall be final regarding the acceptability and completeness of all testing.

G. Check the entire PCP for proper installation, calibration and adjustment on a loop-by-loop and component-by-component basis to ensure that it is in conformance with related submittals and the PCP Specifications.

H. The Loop/Component Inspections and Tests shall be implemented using approved forms and checklists. These shall be developed by the SYSTEM SUPPLIER and submitted for approval.

I. Loop Status Report: Each control loop shall have a Loop Status Report to organize and track its inspection, adjustment, and calibration. These reports shall include the following information and check-off items with spaces for sign-off by the SYSTEM SUPPLIER:

1. Project Name

2. Control Loop Number or description

3. Tag Number or description for each component of the control loop

4. Check-offs/sign-offs for each component for proper installation, termination, and calibration/adjustment

5. Check-offs/sign-offs for the control loop for proper panel interface terminations, 1/0 interface terminations, I/0 signal operation relative to the computer network, and total loop operation ready

6. Space for comments

J. Component Calibration Sheet: Each field instrument element and each PLC I/0 module shall have a Component Calibration Sheet. These sheets shall have the following information, spaces for data entry, and a space for signoff by the SYSTEM SUPPLIER:

1. Project Name

2. Component Identification or I/0 Module Number

3. Manufacturer, Model Number/Serial Number of field element

4. Summary of Functional Requirements (scale, range, computing equation, control action, etc.)

5. Calibrations of span, setpoints, and preset adjustable parameters

6. Space for comments

K. Maintain the Loop Status Reports and Component Calibration Sheets at the jobsite and make them available to the ENGINEER at any time.

L. Witnessing: These inspections and tests do not require witnessing. However, the ENGINEER will review the Loop Status Sheets and Component Calibration Sheets and spot-check their entries periodically and upon completion of the Operational Check-out Tests. Correct any deficiencies found.

3.06. FIELD ACCEPTANCE TEST

A. Once the PCP has passed the ORT, the SYSTEM SUPPLIER shall perform a witnessed Field Acceptance Test (FAT) on the complete system. The FAT shall demonstrate that the system is operating and in compliance with the Contract requirements. Each specified function shall be demonstrated on a paragraph-by-paragraph basis.

B. The system shall operate for a continuous 40 hours without failure before this test will be considered successful.

C. The FAT shall cover the entire system, including control functions, alarms, and status monitoring. Test procedures used for shop tests may be adopted for these tests if modified as required.

END OF SECTION

DIVISION 15

MECHANICAL

SECTION 15000
PIPING

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish and install all piping systems shown and specified, in accordance with the requirements of the Contract Documents. Each system shall be complete with all necessary fittings, hangers, supports, anchors, expansion joints, flexible connectors, valves, accessories, lining and coating, testing, excavation, backfill and encasement, to provide a functional installation.

1.02 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Commercial Standards:

ANSI/ASME B1.20.1	Pipe Threads, General Purpose (inch).
ANSI B16.1	Cast Iron Pipe Flanges and Flanged Fittings, Class 125.
ANSI B16.12	Cast Iron Threaded Drainage Fittings
ANSI B16.5	Pipe Flanges and Flanged Fittings, Steel Nickel Alloy and other Special Alloys.
ANSI/ASME B16.3	Malleable Iron Threaded Fittings, Classes 150 and 300.
ANSI/ASME B16.4	Cast Iron Threaded Fittings, Class 125 and 250
ANSI/AWWA C104/A21.5	Cement-Mortar Lining for ductile-Iron Pipe and Fittings for Water.
ANSI/AWWA C110/A21.10	Ductile-Iron and Gray-Iron Fittings 3-in. through 48-in. for Water and Other Liquids.
ANSI/AWWA C111/A21.11	Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe Fittings.

ANSI/AWWA C151/A21.51	Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids.
ANSI/AWWA C600	Installation of Ductile-Iron Water Mains and Appurtenances.
ANSI/AWWA C900	Polyvinyl Chloride (PVC) Pressure Pipe 4-inc. through 12-in. for Water.
ANSI/AWWA L115/A21.15	Flanged Ductile Iron Pipe with Threaded Flanges. Steel Pipe Flanges for Water Works Service, Sizes 4 in. through 144 in.
ANSI/AWS D1.1	Structural Welding Code.
ASTM A 307	Specification for Carbon Steel Externally Threaded Standard Fasteners.
ASTM D 2000	Classification System for Rubber Products in Automotive Applications.
ASTM D 1784	Specifications for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
ASTM D 2241	Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR-Series).
ASTM D 2321	Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.
ASTM D 3034	Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
ASTM D 1785	Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedule 40, 80, and 120.
ASTM D 695	Test for Compressive Properties of Rigid Plastics.

ASTM D 1599	Test for Short-Time Rupture Strength of Plastic Pipe, Tubings and Fittings.
NSF/ANSI 61	Standards for Drinking Water System Components

1.03 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 Section 01300, "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, service, pipe size, working pressure, wall thickness, lining, coating, 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.

3. Weight of all component parts.

4. Design calculations where specified.

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, "Submittals".

E. All expenses incurred in making samples for certification of tests shall be borne by the Contractor.

1.04 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.

1.05 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.

1.06 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.

1.07 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 furnished as specified herein.

B. All piping systems shall be designed for the maximum expected pressure as defined herein.

C. All pipes shall be adequately supported in accordance with the requirements of the Section entitled “Pipe Supports”.

D. All PVC pipe shall be continuously and permanently marked with the manufacturer’s name, pipe size, and pressure rating in psi.

2.02 PVC PIPE - SOLVENT-WELDED

A. PVC pipe shall be made from all new rigid unplasticized polyvinyl chloride and shall be Normal Impact Class 12454-B, Schedule 80, NSF 61 (Color white or blue) to conform to ASTM D 1785, unless otherwise shown. Elbows and tees shall be of the same material as the pipe.

B. Unless otherwise shown, joint design shall be for solvent-welded construction. Where required, unions shall be socket-weld type with Viton O-ring.

C. Solvent cement for socket type, welded joints shall be industrial grade “grey glue” conforming to ASTM D 2564.

D. Acceptable Manufacturers:

1. Heitage Plastics South Inc.

2. JM Pipe

3. Accord Industries/Universal 100 Products

4. Charlotte

2.03 MISCELLANEOUS PLUMBING

A. Potable Hose Bibbs:

1. Potable water hose bibbs shall be provided with 1-inch union inlet, vacuum breaker, tee handle rough chrome plated by Chicago Faucet or equal.

2. Provide permanent plastic or brass tags located above the bibbs which state “Potable Water”. Letters shall be ¾-inch height.

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. The Owner reserves the right, however, to make minor changes in grade and/or alignments as the Work progresses. 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 location. 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 pumps, valves, equipment, etc., in accordance with the respective manufacturers' recommendations. This includes the use of flexible connectors as required.

D. For piping assembled with threaded, solvent cemented, welded or soldered joints, liberal use of unions shall be made. Unions shall be provided close to main pieces of equipment and in branch lines to permit ready dismantling of piping without disturbing main pipe lines or adjacent branch lines. A minimum of one union per straight run of pipe between fitting and/or valves with multiple lengths of pipe shall be used.

E. All changes in directions or elevations shall be made with fittings, unless otherwise shown.

3.02 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. Pipe shall be installed in accordance with the manufacturer's recommendation.

C. Lines shall be laid straight and plumb. No abrupt changes in direction or grade will be allowed.

3.03 SOLVENT CEMENTED JOINTS

A. Joints shall be made up in accordance with ASTM D2855 and the manufacturers’ recommendations. The Contractor is advised to handle the solvent cements in accordance with ASTM F402. Glue shall be industrial grade suitable for specified pipe schedule.

3.04 AS-BUILT DRAWINGS

A. As Built Drawings shall be submitted to the Engineer prior to acceptance of the Work and placing the piping in service.

3.05 PIPE SCHEDULE

A. This section includes schedule of piping specified herein.

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)
316 SS	- 316 Stainless Steel (nonwelded joints) or 316L Stainless Steel - low carbon (welded joints)
DIP	- Ductile Iron
PVC	- Polyvinylchloride

2. Wall Thickness

CL	- Class
Sch	- Schedule
SDR	- Standard Diameter Ratio

3. Joint Type

CJ	- Compression Joint
FL	- Flanged
PO	- Push on Joint
RJ	- Restrained Joint
SW	- Solvent Welded
Thd	- Threaded
Wld	- Welded

4. Fitting Type

304 SS	- 304 Stainless Steel (nonwelded joints) or 304L Stainless Steel - low carbon (welded joints)
316 SS	- 316 Stainless Steel (nonwelded joints)
DI	- Ductile Iron
PVC	- Polyvinylchloride
Stl	- Steel

5. Interior Surface Protection

AC	- Asphalt Coated
ACCL	- Asphalt Coated Cement Lined
EL	- Epoxy Lined
GAL	- Galvanized
PVC	- PVC Liner

6. Exterior Surface Protective Coating

AC	- Asphalt Coated (below ground only)
GAL	- Galvanized
P	- Painted (above ground only)

C. PIPE SCHEDULE

Service	Nominal Pipe Diameter (inches)	Material	Thickness Class or Schedule	Pressure (PSIG)		Type of Joints	Type of Fittings	Protective Coating	
				Test	Operating			Interior	Exterior
Coagulant Piping	≤ 4"	PVC	Sch. 80	150	100	SW	PVC		P
Potable Water	≤ 4"	PVC	Sch. 80	150	100	SW	PVC	--	P

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 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Commercial Standards

ANSI/ASME B31.1	Power Piping.
ASTM A 123	Specifications for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip.

1.03 SUBMITTALS

A. Shop Drawings

1. The Contractor shall furnish complete shop drawings of all pipe supports, hangers, anchors, and guides, as well as calculations for special supports and anchors, in accordance with Section entitled "Submittals."

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

A. As a minimum, supports shall be provided where identified on the Drawings. The Contractor shall note that all pipe support locations are not shown on the Drawings and 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. All supports and parts required for the installation of the piping systems shall conform to the requirements of the ANSI Code for Pressure Piping B-31.1 and MSS Standard practice SP- 58 and SP-69, except as modified and supplemented by the requirements set forth herein. All piping shall be supported in such a manner to fulfill the intent of this Specification.

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 Contract Drawings, piping supports shall consist of concrete piers or fabricated steel supports as specified below. Materials and workmanship shall be in full compliance with the Sections entitled "Concrete Formwork", "Concrete Reinforcement", and Division 5 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 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 (flowmeters, etc.) shall be removable without the need for temporary supports for adjacent and connecting piping.

F. In general, the type of pipe supports to be used shall be as follows unless otherwise shown on the Drawings:

Height of Centerline of Pipe Above Floor	**Type of Support**
0 - 3 ft.	Concrete Pier
3 - 6 ft.	Adjustable Pipe Saddle or Bracket Supports
Greater than 6 ft.	Hangers

G. Wall bracket supports shall be used where shown for pipe to be installed adjacent to a wall. Where it is not feasible to install hanger supports, adjustable pipe saddle supports may be used with the permission of the Engineer.

H. The Contractor shall install pipe supports in conformance with these Specifications unless otherwise shown on the Contract Drawings. Where deviations and modifications are required, they shall be made only with the permission of the Engineer. A detailed layout of pipe supports for each building shall be submitted to the Engineer for review.

I. For all couplings, supports shall be placed on each side and as close to the coupling as, possible. Supports shall be of the guide type which prevent axial movement resulting in pipe deflection or misalignment.

J. Structural steel members can be used to support pipe.

K. Stainless steel piping installed in tanks, channels or conduits shall be supported by hangers, hanger rods, hardware and inserts fabricated of 316 stainless steel.

L. 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.

M. All support, saddles, bearing plates, and hangers, shall support by direct contact the pipe a minimum of 120 degrees around, except as specified herein.

N. Where continuous concrete inserts are used, the maximum concentrated load on the end two (2) inches of inserts, with laying lengths of eight (8) inches or longer, shall not be more than 50 percent of the maximum recommended loading of the channel. All pipe supports shall be positioned such that they will not interfere with the use of hoisting equipment, where provided.

O. Pipes subject to thermal expansion shall be installed perfectly aligned and concentrically guided. These piping (process air, hot water, etc.) support systems shall be roller supports as specified herein and shall be submitted to the Engineer for review. The submittal shall show location of anchors, concentric pipe guides and expansion joints (single or double).

2.02 PIPE SUPPORT SPACING

A. 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 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.

B. The distance between supports shall not exceed that listed in the following schedule unless otherwise noted:

Nominal Pipe Size (in.)	Metallic Piping (ft.)	Plastic, Fiberglass and Copper Piping (ft.)
1/2	5	3
3/4 to 1-1/2	6	3
2 to 3	6	4
4	10	5
6 and larger	10	6

2.03 PIPE HANGERS AND HANGER RODS

A. Where pipe hangers are used, they shall be of the clevis or friction clamp type except where there is longitudinal movement due to temperature changes. Where longitudinal movement occurs, the adjustable yoke roller type hanger shall be used. See the hanger schedule below for location/type of hangers to be used. Pipe hangers shall be capable of supporting the pipe in all conditions of operation. They shall allow free expansion and contraction of the piping, and prevent excessive stress resulting from transferred weight being induced into the pipe or connected equipment.

B. Hangers shall be designed so that they can not become disengaged by movements of the supported pipe. Lock nuts shall be used on all hangers. All piping systems shall be supported by means of hangers having an individual means of vertical adjustment for leveling of lines after piping is in place.

C. Spacing and arrangements shall conform to the requirements of Section 6, Chapter 1 of ANSI B31-1 code for pressure piping. Spacing indicated shall be the maximum spacing.

D. Hanger rods shall be subject to tensile loading only. At hanger locations where lateral or axial movement is anticipated, suitable linkage shall be provided to permit swing. Stainless steel hangers required in the pipe hanger schedule shall be supported by hanger rods, hardware and inserts fabricated of 316 stainless steel. All other rods, hardware and inserts shall be fabricated of hot-dip galvanized steel.

E. All concrete inserts and/or expansion bolts shall be capable of supporting the maximum working load of the rod which is attached to it.

F. Sheet metal insulation protector saddle shall be used for all hot water piping, refrigerant piping, etc. Saddle shall be Anvil, or equal.

G. A neoprene isolation pad shall be provided between galvanized clevis and stainless steel piping.

2.04 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.

2.05 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.

2.06 HARNESSED PIPE SUPPORTS

A. Pipe harness straps shall be provided on concrete pedestal supports where shown on the Drawings and required by these Specifications.

B. Harness straps shall be 1/4-inch thick, 316 stainless steel and attached to the concrete pedestal supports by stainless steel anchors.

C. Strap width shall be in accordance with the Table below:

Pipe Diameter	**Strap Width**
4 inches and below	2 inches
6 inches and above	3 inches

2.07 METAL FRAMING SYSTEMS

A. A metal framing system as manufactured by Unistrut, Globe-Strut or approved equal may be used for supporting the piping system. The metal framing system shall be designed and installed according to manufacturer's recommended procedure and shall be capable of supporting the piping system as specified herein.

B. Channels, inserts and closure strips shall be cold formed mild steel conforming to ASTM A- 245.

C. Fittings shall be Hot Rolled Steel conforming to ASTM A-30 or ASTM A-245. Fasteners shall conform to ASTM A-30. All pieces shall be hot-dip galvanized after fabrication, unless otherwise noted on the Drawings.

2.08 PLASTIC PIPE SUPPORTS

A. All pipe supports that will be used with plastic pipe shall be provided with a bearing plate where the width of hanger is less one-half (1/2) of the supported pipe's diameter. The bearing plate must provide bearing 180 degrees around and shall have a minimum laying length of 1/2 the pipe diameter or three (3) inches minimum. The bearing plates shall be rigid, corrosion resistant and not subject to long term plastic flow properties. To assure one hundred (100) percent bearing. the pipe shall be seated on a filler. This material shall be compatible for use with the pipe. Clamps to be used with plastic pipe shall be fitted snug and shall not exert clamp pressure on the pipe.

2.09 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 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.

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 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.

2.10 MANUFACTURED SUPPORTS

A. Where not specifically shown or detailed, designs, generally accepted as exemplifying good engineering practice, using 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. Support products shall be supplied by the following manufacturer's, or equal:

1. Basic Engineers, Pittsburgh, PA;

2. Bergen-Paterson Corp., Boston, MA;

3. Elcen Metal Products Company, Franklin Park, Il;

4. Anvil.

5. NPS Industries, Inc., Secaucus, NJ.

2.11 COATING

A. Unless otherwise shown or specified, all fabricated pipe supports, other than stainless steel or non-ferrous supports, shall be blast-cleaned after fabrication and hot-dip galvanized in accordance with ASTM A 123.

B. Other than the supports mentioned in Paragraph 2. 11A, all supports shall receive protective coatings in accordance with the requirements of Section entitled "Painting."

PART 3 - EXECUTION

3.01 INSTALLATION

A. 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. All concrete inserts for pipe hangers and supports shall be coordinated with the formwork.

B. Pipe supports and hangers shall be positioned in such a way as to produce an orderly, neat piping system. All hanger rods shall be vertical, without offsets. Hangers shall be adjusted to line up groups of pipes at the proper grade for drainage and venting, as close to ceilings or roofs as possible, without interference with other Work.

C. 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 support per laying length of pipe on uninterrupted horizontal runs. This support shall be placed within one foot of the joint. If the pipe manufacturer recommends a smaller spacing interval than specified herein, then the manufacturer's spacing shall be used.

D. Each section of the pipe line shall be laid out and all connections made while the pipe is held in temporary supports. After completion of connections, the pipe may be clamped in position. When piping is correctly installed, a clamp or pipe connection may be loose or removed without displacement of the pipe line.

3.02 FABRICATION

A. Pipe hangers and supports shall be fabricated and installed by experienced welders and fitters, using the best welding procedures available. Fabricated supports shall be neat in appearance without sharp corners, burrs, and edges.

END OF SECTION

SECTION 15100
VALVES

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall provide all tools, supplies, materials, equipment, and labor necessary for furnishing, installing, adjusting, and testing of all valves and appurtenant work, complete and operable, in accordance with the requirements of the Contract Documents.

B. 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.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Commercial Standards:

ANSI/ASME B1.20.1	General Purpose Pipe Threads (Inch).
ASTM A 48	Specification for Gray Iron Castings.
ASTM A 126	Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
ASTM A 536	Specification for Ductile Iron Castings.
ASTM B 62	Specification for Composition Bronze or Ounce Metal Castings.
ASTM B 584	Specification for Copper Alloy Sand Castings for General Applications.
AWWA C550	Protective Interior Coatings for Valves and Hydrants.
ASTM D 1784	Specifications for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.

ASTM D 2241	Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR-Series).
NSF/ANSI 61	Standards for Drinking Water System Components

1.03 SUBMITTALS

A. Shop Drawings: Shop drawings of all valves and operators including associated wiring diagrams and electrical data, shall be furnished as specified in Section 01300, "Submittals".

B. Data to be submitted shall include but not be limited to:

1. Catalog data consisting of specifications, assembly and installation drawings, and a parts schedule that identifies the materials to be used various parts and accessories. The illustrations shall be in sufficient detail to serve as a guide for assembly and disassembly.

2. Weight of all component parts and assembled weight.

3. Listing of all lubricants required for the equipment.

4. Spare parts and special tools.

5. Operation and maintenance manuals as required by Section 01300 entitled “Submittals”.

1.04 QUALITY ASSURANCE

A. Unless otherwise specified, each valve body shall be tested under a test pressure equal to twice its design water-working pressure.

B. Unless otherwise specified, all interior bronze parts of valves shall conform to the requirements of ASTM B 62, or, where not subject to dezincification, to ASTM B 584.

1.05 TOOLS

A. Special tools, if required for normal operation and maintenance shall be supplied with the equipment.

PART 2 - PRODUCTS

2.01 VALVES – GENERAL REQUIREMENTS

A. The Contractor shall furnish all valves, stem extensions, and other accessories as shown or specified. All valves shall be new and of current manufacture.

B. All valves shall have a minimum design pressure rating of 150 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.

C. All valves and appurtenances shall have the name of the maker and the working pressure for which they are designed cast in raised letters upon some appropriate part of the body.

D. Cast iron parts of valves shall meet the requirements of ASTM A 126, "Standard Specifications for Grey 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.

E. All castings shall be clean and sound, without defects of any kind and no plugging, welding or repairing of defects will be permitted. All bolt heads and nuts shall be hexagonal conforming to ANSI B18.2.1. 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.

F. Where subject to dezincification, gate valve stems shall be of bronze to ASTM B 62, containing not more than 5 percent of zinc nor more than 2 percent of aluminum. Where dezincification is not a problem, bronze to ASTM B 584 may be used. For valve stems with a minimum tensile strength of 60,000 psi, a minimum yield strength of 40,000 psi, and an elongation of at least 10 percent in 2 inches, as determined by a test coupon poured from the same ladle from which the valve stems to be furnished are poured.

2.02 OPERATORS, GENERAL

A. Valves and gates shall be furnished with operators, provided by the valve or gate 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.

B. All operators, unless otherwise specified, shall turn counter- clockwise to open. Operators shall have the open direction clearly and permanently marked. All valve operators, manual, electric and pneumatic, shall be provided with the valve by the valve manufacturer. 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.

C. All manual operators shall have levers or handwheels, unless otherwise shown. Valves mounted higher than 6 feet above floor or operating level shall have chain operators. Chains shall extend to within three (3) feet from operating floor. Unless otherwise shown or specified, valves of sizes 4-inch and larger shall have gear-assisted operators. Valves over five (5) feet to center line shall be rolled toward the operating side to make the handwheel or wrench more accessible.

D. Operation of valves and gates shall be designed so that the effort required to operate the handwheel, lever or chain shall not exceed 40 pounds applied at the extremity of the wheel or lever. The handwheels on valves 14 inches and smaller shall not be less than 8 inches in diameter, and on valves larger than 14 inches the handwheel shall not be less than 12 inches in diameter.

E. Chainwheel operator shall be fabricated of malleable iron and pocketed type chainwheels with chain guards and guides. Chainwheel operators shall be marked with an arrow and the word "open" indicating direction to open. The operators shall have galvanized smooth welded link type chain. Chain that is crimped or has links with exposed ends shall not be acceptable.

2.03 PLASTIC BALL VALVES

A. Plastic ball valves shall be used at all PVC pipe installations where required, and be made of polyvinyl chloride (PVC). All valves shall have manual operators unless otherwise specified or shown on the Drawings.

B. All plastic ball valves shall have threaded union ends or flanged ends to ANSI B16.5, Class 150, for easy removal. The balls shall have full size ports and Teflon seats. All body seals, union O-ring seals, and stem seals shall be Viton. The valves shall be suitable for a maximum working non-shock pressure of 150 psi at Plastic ball valves used for commercial bleach piping shall be provided with factory drilled vent in the balls. The valves shall be installed so that the vent points upstream when the valve is in the closed position. Contractor shall coordinate position of each vented valve with Engineer prior to installation.

C. Suppliers, or equal:

1. ASAHI-AMERICA.

2. GF Plastic Systems, Inc.

3. ITT Engineered Valves.

4. NIBCO Inc. (Chemtrol).

5. Watts Regulator Company.

2.04 STAINLESS STEEL BALL VALVES

A. Ball valves for use with stainless steel piping systems, including instrument isolation, air lines, and moisture drains shall be end entry type with type 316 stainless steel body and trim, Teflon seats and seals and flanged or threaded connections as indicated. Valve body shall be either two or three piece design, no internal ring for the ball shall be acceptable. Valves shall be class 150, ASTM A479 GR 316 or ASTM A351 GR CF8M, rated 1,000-pound WOG.

B. Valves shall be supplied with stainless steel manual lever or "T" handle. Valves used as moisture drain valves shall be installed at low points of the line and piped to drain.

C. Suppliers, or Equal

1. Janesbury Corporation;

2. Jenkins Bros.;

3. Lunkenheimer Flow Control;

4. Wm. Powell Company;

5. Worcester Controls;

6. Swagelock Series 40 (instrument isolation) or Series 60 (SS Ball Valve).

2.05 HOSE BIBBS

A. Hose bibbs shall be brass body, 1-inch unless otherwise noted. All hose bibbs shall be equipped with a brass or bronze Watts in-line vacuum breaker.

PART 3 - EXECUTION

3.01 VALVE INSTALLATION

A. All valves and appurtenances shall be installed in accordance with the manufacturer's written instructions and in the locations shown, true to alignment and rigidly supported. Any damage to the valves and appurtenances shall be repaired to the satisfaction of the Engineer before they are installed.

B. 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.

3.02 TESTING

A. All valves shall be hydrostatically field tested at the specified pipeline test pressures specified in the piping sections. Any leakage or "sweating" of joints shall be stopped and all joints shall be tight.

END OF SECTION

SECTION 15995
PIPELINE TESTING AND DISINFECTION

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall perform flushing and testing of all pipelines and appurtenant piping, complete, including conveyance of test water to point of use and all disposal thereof, all in accordance with the requirements of the Contract Documents. The cost of all testing shall be borne by the Contractor.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Commercial Standards

ANSI/AWWA	C600	Standard for installation of Ductile –Iron and their appurtenances.
ANSI/AWWA	C651	Standard for Disinfection Water Mains.

1.03 SUBMITTALS

A. A testing schedule, including proposed plans for water conveyance, control and disposal shall be submitted in writing for review a minimum of 48 hours before testing is to start.

B. Contractor shall submit certified test reports as required by this Section.

PART 2 - PRODUCTS

2.01 MATERIALS REQUIREMENTS

A. All test equipment, temporary valves or bulkheads, or other water control equipment and materials shall be determined and furnished by the Contractor 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.

B. All pressure pipelines shall be tested in accordance with ASNI/AWWA C600. All testing operations shall be performed in the presence of the Owner.

3.02 HYDROSTATIC TESTING OF WATER AND PROCESS PIPELINES

A. Prior to hydrostatic testing, all pipelines shall be flushed or blown out as appropriate. The Contractor shall test all pipelines either in sections or as a unit. No section of the pipeline shall be tested until all field-placed concrete or mortar have attained an age of 14 days. The test shall be made by closing valves when available, or by placing temporary bulkheads in the pipe and filling the line slowly with water. The Contractor shall be responsible for ascertaining that all test bulkheads are suitably restrained to resist the thrust of the test pressure without damage to, or movement of, the adjacent pipe. Care shall be taken to see that all air vents are open during filling.

B. The pipeline shall be filled at a rate which will not cause any surges or exceed the rate at which air can be released through the air valves at a reasonable velocity and all the air within the pipeline shall be properly purged. After the pipeline or section thereof has been filled, it shall be allowed to stand under a slight pressure for at least 24 hours to allow the concrete or mortar lining, as applicable, to absorb what water it will and to allow the escape of air from any air pockets. During this period, bulkheads, valves, and connections shall be examined for leaks. If leaks are found, corrective measures satisfactory to the Engineer shall be taken.

C. The hydrostatic test shall consist of holding the test pressure on the pipeline for a period of 2 hours. The test pressure for piping shall be as required in Section “Piping”, measured at the lowest point of the pipeline section being tested. All visible leaks shall be repaired in a manner acceptable to the Engineer.

D. The maximum allowable leakage for pipelines shall be 20 U.S. gallons per inch of diameter per mile of pipe per 24 hours for pipe with 20-ft or less joint lengths and with rubber-gasketed joints. In the case of pipelines that fail to pass the prescribed leakage test, the Contractor shall determine the cause of the leakage, shall take corrective measures necessary to repair the leaks, and shall again test the pipelines.

3.03 DISINFECTION OF POTABLE WATER LINES

A. Before being placed in service, all new chemical lines, potable water lines and repaired portions of, or extension to existing mains shall be disinfected. Disinfection shall be done in accordance with the provisions of AWWA Standard C651 and the Palm Beach County Health Department.

B. The basic disinfection procedure consists of:

1. Preliminary flushing according to Section 5.2.2 of AWWA C600.

2. Chlorine application according to Section 5.2.3 of AWWA C651.

3. Final flushing according to Section 6.1 and 6.2 of AWWA C651.

4. Bacteriological testing according to Standard Methods for Examination of Water and Wastewater.

5. Repeat procedure (if necessary), until satisfactory bacteriological testing has been achieved.

C. The Contractor shall pay for all costs associated with sample collection and testing by an approved laboratory for conformance to bacterial limitation for public drinking water supplies. As a minimum, two samples on each of 2 consecutive days from each separable part of pipeline will be obtained and analyzed by standard procedures and as outlined by the state and local regulatory agencies. Sampling points shall be as directed by the Engineer. If the minimum samples and required above are not bacterially clear, the disinfectant testing operation shall be repeated at the Contractor's expense.

END OF SECTION

DIVISION 16

ELECTRICAL

SECTION 16010
BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 SCOPE

A. The scope of the Project shall include the complete renovation of the eelectrical systems for City of Lake Worth Lime System Upgrades and Improvements.

B. The CONTRACTOR shall provide all the required materials, labor, panels, controls, instrumentation, hazardous location installations, mounting hardware, electrical utility modifications, and general coordination for a complete electrical system.

C. The work shall include complete testing of all equipment and wiring at the completion of the work and making any minor connection changes or adjustments necessary for the proper functioning of the system and equipment. All workmanship shall be of the highest quality; sub-standard work will be rejected.

D. Each bidder or his authorized representative is to visit the job site before preparing his proposal. The submission of the proposal by the bidder shall be considered evidence that he has visited the site and noted the locations and conditions under which the work will be performed and that he takes full responsibility for complete knowledge of all factors governing his work.

E. It is the intent of these specifications that the electrical system shall be suitable in every way for the service required. All material and all work, which may be reasonably implied as being incidental to the work of this section, shall be furnished at no extra cost.

1.02 RELATED SECTIONS

A. Requirements specified within this Section apply to all sections in Division 16, ELECTRICAL. Work specified herein shall be performed as if specified in the individual sections.

B. Division 11.

1.03 SUBMITTALS

A. Quality Control Submittals:

1. Control Panels

2. Control devices
3. Raceways, fittings
4. Factory test certification and reports for all major electrical equipment
5. Conductors
6. Disconnect switch
7. Surge protection devices

1.04 INTERPRETATION OF DRAWINGS

A. The Drawings are not intended to show exact locations of conduit runs.

B. All three-phase circuits shall be run in separate conduits unless otherwise shown on the Drawings.

C. Unless otherwise approved by the ENGINEER, conduit shown exposed shall be installed exposed; conduit shown concealed shall be installed concealed.

D. Where circuits are shown as "home-runs," all necessary fittings and boxes shall be provided for a complete raceway installation.

E. The locations of equipment shown on the Drawings are approximate only. Exact locations shall be as approved by the ENGINEER during construction. Obtain in the field all information relevant to the placing of electrical work and in case of any interference with other work, proceed as directed by the ENGINEER and furnish all labor and materials necessary to complete the work in an approved manner.

F. Circuit layouts shown are not intended to show the number of fittings; or other installation details. Furnish all labor and materials necessary to install and place in satisfactory operation all power and other electrical systems shown. Additional circuits shall be installed wherever needed to conform to the specific' requirements of the equipment.

G. The ratings of motors and other electrically operated devices together with the size shown for their branch circuit conductors and conduits are approximate only and are indicative of the probable power requirements insofar as they can be determined in advance of the purchase of equipment.

H. All connections to equipment shall be made as shown, specified and directed and in accordance with the approved shop drawings, regardless of the number of conductors shown on the Electrical Drawings.

1.05 RECORD DRAWINGS

A. As the work progresses, legibly record all field changes on a set of project

Contract Drawings. When the project is complete, furnish a complete set of reproducible "As-built" drawings for the Project Record Documents.

B. As-built drawings shall be provided in 22" x 34" format and Autocadd format.

1.06 COMPONENT INTERCONNECTIONS

A. Component equipment furnished under this Specification will not be furnished as integrated systems.

B. Analyze all systems components and their shop drawings; identify all terminals and prepare drawings or wiring tables necessary for component interconnection.

PART 2 - PRODUCTS

2.01 GENERAL

A. Provide materials and equipment listed by UL wherever standards have been established by that agency.

B. Equipment Finish:

1. Provide manufacturers' standard finish and color, except where specific color is indicated.

2. If manufacturer has no standard color, provide equipment with ANSI No. 61, light gray color.

PART 3 - EXECUTION

3.01 GENERAL

A. Electrical Drawings show general locations of equipment, devices, and raceway, unless specifically dimensioned.

B. Install work in accordance with NECA Standard of Installation, unless otherwise specified.

C. Work shall be directed by a certified Journeyman Electrician meeting all county and city requirements.

3.02 LOAD BALANCE

A. Drawings and Specifications indicate circuiting to electrical loads and distribution equipment.

B. Balance electrical load between phases as nearly as possible on switchboards, panelboards, motor control centers, and other equipment where balancing is required.

C. When loads must be reconnected to different circuits to balance phase loads, maintain accurate record of changes made, and provide circuit directory that lists final circuit arrangement.

3.03 CHECKOUT AND STARTUP

A. Voltage Field Test:

1. Check voltage at point of termination of power company supply system to project when installation is essentially complete and is in operation.

2. Check voltage amplitude and balance between phases for loaded and unloaded conditions.

3. Unbalance Corrections:

a. Make written request to power company to correct condition if balance (as defined by NEMA) exceeds 1 percent, or if voltage varies throughout the day and from loaded to unloaded condition more than plus or minus 4 percent of nominal.

b. Obtain a written certification from a responsible power company official that the voltage variations and unbalance are within their normal standards if corrections are not made.

B. Equipment Line Current Tests:

1. Check line current in each phase for each piece of equipment.

2. Make line current check after power company has made final adjustments to supply voltage magnitude or balance.

3. If any phase current for any piece of equipment is above rated nameplate current, prepare Equipment Line Phase Current Report that identifies cause of problem and corrective action taken.

C. Meg test all conductors and motors with a 500 ohm megger and submit results in writing.

D. Provide qualified electrician as required during test and startup.

END OF SECTION

SECTION 16050
BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this Section:

1. American National Standards Institute (ANSI):

   a. C55.1, Standard for Shunt Power Capacitors.

   b. C62.11, Standard for Metal-Oxide Surge Arrestors for AC Circuits.

   c. Z55.1, Gray Finishes for Industrial Apparatus and Equipment.

2. American Society for Testing and Materials (ASTM):

   a. A167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

   b. A240, Standard Specification for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels.

   c. A570, Standard Specification for Steel, Sheet, and Strip, Carbon, Hot-Rolled, Structural Quality.

3. Federal Specifications (FS):

   a. W-C-596, Connector, Receptacle, Electrical.

   b. W-S-896E, Switches, Toggle, Flush Mounted.

4. National Electrical Contractor's Association, Inc. (NECA): 5055, Standard of Installation.

5. National Electrical Manufacturers Association (NEMA):

   a. 250, Enclosures for Electrical Equipment (1,000 Volts Maximum).

   b. AB 1, Molded Case Circuit Breakers and Molded Case Switches.

   c. CP 1, Shunt Capacitors.

   d. ICS 2, Industrial Control Devices, Controllers, and Assemblies.

   e. KS 1, Enclosed Switches.

   f. LA 1, Surge Arrestors.

g. PB 1, Panelboards.

h. ST 20, Dry-Type Transformers for General Applications.

i. WD 1, General Requirements for Wiring Devices.

6. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC).

7. Underwriters Laboratories, Inc. (UL):

a. 67, Standard for Panelboards.

b. 98, Standard for Enclosed and Dead-Front Switches.

c. 198C, Standard for Safety High-Interrupting-Capacity Fuses, Current-Limiting Types.

d. 198E, Standard for Class Q Fuses.

e. 486E, Standard for Equipment Wiring Terminals.

f. 489, Standard for Molded Case Circuit Breakers and Circuit Breaker Enclosures.

g. 508, Standard for Industrial Control Equipment.

h. 810, Standard for Capacitors.

i. 943, Standard for Ground-Fault Circuit Interrupters.

j. 1059, Standard for Terminal Blocks.

k. 1561, Standard for Dry-Type General-Purpose and Power Transformers.

l. All county, state, and local specifications.

1.02 SUBMITTALS

A. Shop Drawings:

1. Device boxes and fittings for use in hazardous areas.

2. Junction and pull boxes used at, or below, grade.

3. Terminal junction boxes.

4. Panelboards and circuit breaker data.

5. Fuses.

6. Contactors.

7. Control panel.

8. Relays, phase monitors, surge protection, and lightning arrestors.

1.03 QUALITY ASSURANCE

A. UL Compliance: Materials manufactured within scope of Underwriters Laboratories shall conform to UL Standards and have an applied UL listing mark.

B. Hazardous Areas: Materials and devices shall be specifically approved for hazardous areas of the class, division, and group shown and of a construction that will ensure safe performance when properly used and maintained.

1.04 COORDINATION

A. CONTRACTOR shall coordinate contractor activities with the OWNER and electrical utility.

PART 2 - PRODUCTS

2.01 OUTLET AND DEVICE BOXES

A. Cast Metal:

1. Type: One-piece.

2. Material: Malleable iron, cast ferrous metal or cast aluminum.

3. Manufacturers:

a. Robroy Industries.

b. Ocal.

2.02 JUNCTION AND PULL BOXES

A. Outlet Boxes Used as Junction or Pull Box: As specified under Article OUTLET AND DEVICE BOXES.

B. Cast Metal Box, Hazardous Locations:

1. NEMA 250, Type 7 or 9 as required for Class, Division, and Group involved.

2. Box: Copper-free aluminum with drilled and tapped conduit entrances.

3. Cover: Hinged with screws.

4. Hardware and Machine Screws: ASTM A167, Type 316 stainless steel.

5. Manufacturers and Products:

a. Crouse-Hinds; Type EJB.

b. Appleton; Type JBEW.

C. Large Stainless Steel Box:

1. NEMA 250, Type 4X.

2. Box: 14-gauge, ASTM A240, Type 316 stainless steel with white enamel painted interior mounting panel.

3. Cover: Hinged with clamps.

4. Hardware and Machine Screws: ASTM A167, Type 316 stainless steel.

5. Manufacturers:

a. Hoffman Engineering Co.

b. Robroy Industries.

2.03 WIRING DEVICES

A. Switches:

1. NEMA WD 1 and FS W-S-896E.

2. Specification grade, totally-enclosed, ac type, with quiet tumbler switches and screw terminals.

3. Capable of controlling 100 percent tungsten filament and fluorescent lamp loads.

4. Rating: 20 amps, 120/277 volts.

a. Color: Brown.

5. Manufacturers: Hubbell HBL Series.

B. Class 1 Division 1 Rated Switches:

1. NEMA 7

2. Suitable for Class I, Division 1 installation.

3. Copper free aluminum bodies and cover.

4. Rating: 20 amps, 120 volts.

5. Manufacturers: Crouse-Hinds EDS Series.

C. Receptacle, Single and Duplex:

1. NEMA WD 1 and FS W-C-596.

2. Specification grade, two-pole, three-wire grounding type with screw type wire terminals suitable for No. 10 AWG.

3. High strength, thermoplastic base color.

a. Color: Brown.

4. Contact Arrangement: Contact to be made on two sides of each inserted blade without detent.

5. Rating: 125 volts, NEMA WD 1, Configuration 5-20R, 20 amps.

6. Manufacturers: Hubbell 5261, 5262.

D. Receptacle, Ground Fault Circuit Interrupter: Duplex, specification grade, tripping at 5 mA.

1. Color: Brown.

2. Rating: 125 volts, NEMA WD 1, Configuration 5-20R, 20 amps, capable of interrupting 5,000 amps without damage.

3. Size: For 2-inch by 4-inch outlet boxes.

4. Standard Model: NEMA WD 1, with No. 12 AWG copper USE/RHH/RHW-XLPE insulated pigtails and provisions for testing.

5. Manufacturers: Hubbell 5362/GFI.

E. Class 1 Division 1 Receptacle, Duplex

1. Suitable for Class I, Division 1 installation.

2. Copper Free Aluminum.

3. Rating: 125 volts, 20 amps with 1” Hub

4. Manufacturers: Crouse-Hinds ENR Series.

2.04 DEVICE PLATES

A. General: Sectional type plates not permitted.

B. Metal:

1. Material: Specification grade, one-piece, 0.040-inch nominal thickness stainless steel.

2. Finish: ASTM A167, Type 302/304, satin.

3. Mounting Screw: Oval-head, finish matched to plate.

C. Weatherproof:

1. For Receptacles: Gasketed, cast metal or stainless steel, with individual cap over each receptacle opening.

a. Mounting Screw: Stainless steel.

b. Cap Spring: Stainless steel.

c. Manufacturers: Hubbell 5400 Series.

2. For Switches: Gasketed, cast metal incorporating external operator for internal switch.

a. Mounting Screw: Stainless steel.

b. Manufacturers:
1) Crouse-Hinds; DS-181 or DS-185.

2.05 PUSHBUTTON, INDICATING LIGHT, AND SELECTOR SWITCHES

A. In accordance with Section xxx, LIFT STATION CONTROL CABINET.

2.06 TERMINAL BLOCK (0 TO 600 VOLTS)

A. In accordance with Section 16960, LIFT STATION CONTROL PANEL.

B. Marking system allowing use of permanent shrink tube type.

2.07 NAMEPLATES

A. Material: Laminated plastic.

B. Attachment Screws: Stainless steel.

C. Color: White, engraved to a black core.

D. Engraving:

1. Pushbuttons/Selector Switches and Pilot Lights: Name of drive controlled on one, two, or three lines, as required.

2. Panelboards: Panelboard designation, service voltage, and phases.

E. Letter Height:

1. Pushbuttons/Selector Switches: 1/8 inch.

2. Panelboards: 1/4 inch.

2.08 SUPPPORT AND FRAMING CHANNELS

A. Stainless Steel Framing Channels: Rolled ASTM A167, Type 316 stainless steel, 12 gauge.

B. Miscellaneous Hardware: Type 316 stainless steel.

C. Manufacturers:

1. B-Line Systems, Inc.

2. Unistrut Corp.

3. Aickinstrut.

PART 3 - EXECUTION

3.01 GENERAL

A. Install equipment in accordance with NECA 5055.

B. Use appropriate conduit and conductor entry fittings with enclosures to maintain the specified enclosure environmental capability after installation.

3.02 OUTLET AND DEVICE BOXES

A. Install suitable for conditions encountered at each outlet or device in the wiring or raceway system, sized to meet NFPA 70 requirements.

3.03 JUNCTION AND PULL BOXES

A. Install where shown and where necessary to terminate, tap-off, or redirect multiple conduit runs.

B. Install pull boxes where necessary in raceway system to facilitate conductor installation.

C. Install in conduit runs at least every 150 feet or after the equivalent of three right-angle bends.

D. Use outlet boxes as junction and pull boxes wherever possible and allowed by applicable codes.

E. Installed boxes shall be accessible.

F. Do not install on finished surfaces.

G. Install plumb and level.

H. Support boxes independently of conduit by attachment to structural member.

I. Boxes embedded in concrete or masonry need not be additionally supported.

J. At or Below Grade:

1. Install boxes for below grade conduits flush with finished grade in locations outside of paved areas, roadways, or walkways.

2. If adjacent structure is available, box may be mounted on structure surface just above finished grade in accessible but unobtrusive location.

3. Obtain OWNER's written acceptance prior to installation in paved areas, roadways, or walkways.

4. Use boxes and covers suitable to support anticipated weights.

K. Mounting Hardware: Type 316L stainless steel.

L. Location/Type:

1. Outdoor, Wet and Corrosive: NEMA 250, Type 4X.

2. Underground Conduit: Concrete.

3.04 WIRING DEVICES

A. Switches:

1. Mounting Height: See Article OUTLET AND DEVICE BOXES.

2. Install with switch operation in vertical position.

3. Install single-pole, two-way switches such that toggle is in up position when switch is on.

B. Receptacles:

1. Install with grounding slot **down** except where horizontal mounting is shown, in which case install with neutral slot up.

2. Ground receptacles to boxes with grounding wire only.

3. Weatherproof Receptacles:

a. Install in cast metal box.

b. Install such that hinge for protective cover is above receptacle opening.

4. Special-Purpose Receptacles: Install in accordance with manufacturer's instructions.

3.05 DEVICE PLATES

A. Securely fasten to wiring device; ensure a tight fit to the box.

B. Flush Mounted: Install with all four edges in continuous contact with finished wall surfaces without use of mats or similar materials. Plaster fillings will not be acceptable.

C. Surface Mounted: Plate shall not extend beyond sides of box unless plates have no sharp corners or edges.

D. Install with alignment tolerance to box of 1/16 inch.

3.06 PUSHBUTTON, INDICATING LIGHT, AND SELECTOR SWITCH

A. Heavy-Duty, Oil-tight Type: Locations (Unless Otherwise Shown): Nonhazardous, indoor, dry locations, including motor control centers, control panels, and individual stations.

3.07 TERMINAL JUNCTION BOX

A. Install in accordance with Article JUNCTION AND PULL BOXES.

B. Label each block and terminal with permanently attached, non-destructible tag.

3.08 DRY TYPE TRANSFORMER (0- TO 600-VOLT PRIMARY)

A. Provide in field panel as shown.

B. Connect voltage taps to achieve (approximately) rated output voltage under normal plant load conditions.

END OF SECTION

SECTION 16110
RACEWAYS

PART 1 - GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this Section:

1. American Association of State Highway and Transportation Officials (AASHTO): Division I, Standard Specifications for Highway Bridges, Fourteenth Edition.

2. American National Standards Institute (ANSI):

   a. C80.1, Rigid Steel Conduit-Zinc Coated.

   b. C80.3, Electrical Metallic Tubing-Zinc Coated.

   c. C80.5, Rigid Aluminum Conduit.

   d. C80.6, Intermediate Metal Conduit (IMC)-Zinc Coated.

3. American Society for Testing and Materials (ASTM):

   a. A123 E1, Standard Specification for Zinc-Coated (Galvanized) Coatings on Iron and Steel Products.

   b. C857, Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures.

4. National Electrical Contractor's Association, Inc. (NECA): 5055, Standard of Installation.

5. National Electrical Manufacturers Association (NEMA):

   a. RN 1, Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.

   b. TC 2, Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).

   c. TC 3, PVC Fittings for Use with Rigid PVC Conduit and Tubing.

   d. TC 6, PVC and ABS Plastic Utilities Duct for Underground Installation.

   e. VE 1, Metallic Cable Tray Systems.

6. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC).

7. Underwriters Laboratories, Inc. (UL):

a. 1, Standard for Safety Flexible Metal Conduit.

b. 6, Standard for Safety Rigid Metal Conduit.

c. 360, Standard for Safety Liquid-Tight Flexible Steel Conduit.

d. 514B, Standard for Safety Fittings for Conduit and Outlet Boxes.

e. 514C, Standard for Safety Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers.

f. 651, Standard for Safety Schedule 40 and 80 PVC Conduit.

g. 651A, Standard for Safety Type EB and Rigid PVC Conduit and HDPF Conduit.

h. 797, Standard for Safety Electrical Metallic Tubing.

i. 870, Standard for Safety Wireways, Auxiliary Gutters, and Associated Fittings.

j. 1242, Standard for Safety Intermediate Metal Conduit.

k. 1660, Standard for Safety Liquid-Tight Flexible Nonmetallic Conduit.

1.02 SUBMITTALS

A. Shop Drawings:

1. Manufacturer's Literature:

a. Aluminum conduit.

b. PVC Schedule 80 conduit.

2. Precast Manholes and Handholes:

a. Dimensional drawings and descriptive literature.

b. Traffic loading calculations.

c. Accessory information.

1.03 UL COMPLIANCE

A. Materials manufactured within scope of Underwriters Laboratories shall conform to UL Standards and have an applied UL listing mark.

PART 2 - PRODUCTS

2.01 CONDUIT AND TUBING

A. Rigid Metal Conduit.

1. Rigid metal conduit shall be for use under the provisions of NEC Article 346.

2. Rigid aluminum conduit shall be 6063 alloy and shall be as manufactured by New Jersey Aluminum Corp., AFC Co., VAW of America, Inc., or approved equal.

B. Rigid Nonmetallic Conduit

1. Rigid nonmetallic conduit shall be for use under the provisions of NEC Article 347.

2. PVC conduit shall be rigid polyvinyl chloride Schedule 80 as manufactured by Carlon, An Indian Head Co., Kraloy Products Co., Inc., Highland Plastics Inc., or approved equal.

C. Liquidtight Flexible Metal Conduit, Couplings and Fittings

1. Liquidtight flexible metal conduit shall be for use under the provisions of NEC Article 351A.

2. Liquidtight flexible metal conduit shall be Sealtite, Type UA, manufactured by the Anaconda Metal Hose Div., Anaconda American Brass Co., American Flexible Conduit Co., Inc., Universal Metal Hose Co., or approved equal.

3. Fittings used with liquidtight flexible metal conduit shall be of the screw-in type as manufactured by the Thomas and Betts Co., Crouse-Hinds Co., or approved equal.

2.02 FITTINGS

A. Flexible Couplings, Non-metallic. Flexible non-metallic couplings shall be as manufactured by the Allied Tube & Conduit Corp., Western Tube & Conduit Corp., or Republic Conduit.

B. Boxes and Fittings. PVC, aluminum and stainless steel switch and outlet covers and boxes shall be manufactured by Raco Mfg, Appleton Electric Co., and Steel City Mfg. or approved equal.

C. Cast aluminum boxes and fittings shall be copper-free aluminum with cast aluminum covers and corrosion-proof screws as manufactured by the Killark Electric Co., Crouse-Hinds Co., Appleton Electric Co., or approved equal.

D. Conduit hubs shall be as manufactured by Meyers Electric Products, Inc., Raco Div., Appleton Electric Co., or approved equal. Conduit grounding hubs shall be provided for all indoor and outdoor conduit terminations.

E. Conduit wall seals shall be Type WSK as manufactured by the O.Z. Electrical Mfg. Co., or approved equal.

F. Combination expansion-deflection fittings shall be Type XD as manufactured by the Crouse-Hinds Co., or approved equal.

G. Conduit wall seals for new concrete walls below grade shall be O.Z./Gedney Co., Type WSK, Spring City Electrical Manufacturing Co., Type WDP, or approved equal.

H. Conduit wall seals for cored holes shall be Type CSML as manufactured by the O.Z./Gedney Co., or approved equal.

I. Conduit wall and floor seals for sleeved openings shall be Type CSMI as manufactured by the O.Z./Gedney Co., or approved equal.

J. Conduit sealing bushings shall be O.Z./Gedney Type CSB or approved equal.

K. EYSR sealing fittings shall be installed in rigid metal conduit systems in hazardous locations, in vertical or horizontal positions, indoors or outdoors as manufactured by Cooper Crouse Hinds or equal.

2.03 ACCESSORIES

A. Identification Devices:

1. Warning Tape:

a. Material: Polyethylene, 4-mil gauge.

b. Color: Red.

c. Width: Minimum 3 inch.

d. Designation: Warning on tape that electric circuit is located below tape.

e. Manufacturers:
1) Blackburn, Type RT.
2) Griffolyn Co.

PART 3 - EXECUTION

3.01 GENERAL

A. Conduit and Tubing sizes shown are based on the use of copper conductors. Reference Section 16120, CONDUCTORS, concerning conduit sizing for aluminum conductors.

B. All installed Work shall comply with NECA 5055.

C. Crushed or deformed raceways not permitted.

D. Maintain raceway entirely free of obstructions and moisture.

E. Immediately after installation, plug or cap raceway ends with watertight and dust-tight seals until time for pulling in conductors.

F. Sealing Fittings: Provide drain seal in vertical raceways where condensate may collect above sealing fitting.

G. Avoid moisture traps where possible. When unavoidable in exposed conduit runs, provide junction box and drain fitting at conduit low point.

H. Group raceways installed in same area.

I. Follow structural surface contours when installing exposed raceways. Avoid obstruction of passageways.

J. Run exposed raceways parallel or perpendicular to walls, structural members, or intersections of vertical planes.

K. Install watertight fittings in outdoor, underground, or wet locations.

L. All metal conduit to be reamed, burrs removed, and cleaned before installation of conductors, wires, or cables.

M. Do not install raceways in concrete equipment pads, foundations, or beams.

N. Horizontal raceways installed under floor slabs shall lie completely under slab, with no part embedded within slab.

O. Install concealed, embedded, and buried raceways so that they emerge at right angles to surface and have no curved portion exposed.

3.02 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.

3.03 CONDUIT APPLICATION

A. Diameter: Minimum 1-inch minimum.

B. All Locations:

1. All exposed power and control raceways shall be in aluminum conduit unless otherwise noted below.

2. Underground power conductors shall be installed in PVC Schedule 80 conduits.

3.04 PENETRATIONS

A. Make at right angles, unless otherwise shown.

B. Notching or penetration of structural members, including footings and beams, not permitted.

3.05 SUPPORT

A. Support from structural members only, at intervals not exceeding NFPA 70 requirements, and in any case not exceeding 8 feet. Do not support from piping, pipe supports, or other raceways.

B. Provide and attach wall brackets, strap hangers, or ceiling trapeze as follows:

1. Concrete or Brick: Expansion shields, or threaded studs driven in by powder charge, with lock washers and nuts.

2. Steelwork: Machine screws.

C. 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.

D. All supports, straps, screws, and hardware shall be Type 316 stainless steel.

3.06 BENDS

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.

3.07 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.

3.08 RIGID STEEL CONDUIT

A. Install in accordance with manufacturer's instructions.

B. Provide PVC boot to cover all exposed threading.

C. Utilize proper tools, dies, wrenches, etc.

3.09 TERMINATION AT ENCLOSURES

A. Cast Metal Enclosure: Provide manufacturer's pre-molded insulating sleeve inside metallic conduit terminating in threaded hubs.

3.10 UNDERGROUND RACEWAYS

A. Grade: Maintain minimum grade of 4 inches in 100 feet, either from one manhole, handhole, or 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 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. Support conduit so as to prevent bending or displacement during backfilling or concrete placement.

G. Installation with Other Piping Systems:

1. Crossings: Maintain minimum 12-inch vertical separation.

2. Parallel Runs: Maintain minimum 12-inch separation.

3. Installation over valves or couplings not permitted.

H. Metallic Raceway Coating: At couplings and joints, coat with raceway coating.

I. Backfill:

1. As specified in Section 02220, TRENCHING, BACKFILLING AND COMPACTING.

2. Do not backfill until inspected by ENGINEER.

3.11 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 Article IDENTIFICATION DEVICES, with waterproof tags attached to pull cord at each end, and at intermediate pull point.

3.12 IDENTIFICATION DEVICES

A. Warning Tape: Install approximately 12 inches above underground or concrete-encased raceways. Align parallel to, and within 12 inches of, centerline of runs.

3.13 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.

END OF SECTION

SECTION 16120
CONDUCTORS

PART 1 - GENERAL

1.01 REFERENCES

A. The following is a list of standards which 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. Association of Edison Illuminating Companies (AEIC):

   a. CS 5, Crosslinked Polyethylene Insulated Shielded Power Cables Rated 5 Through 35 kV.

   b. CS 6, Ethylene-Propylene-Rubber-Insulated Shielded Power Cables Rated 5 Through 69 kV.

4. 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.

5. Institute of Electrical and Electronics Engineers, Inc. (IEEE):

   a. 48, Standard Test Procedures and Requirements or High-Voltage Alternating Current Cable Terminations.

   b. 404, Standard for Cable Joints for Use with Extruded Dielectric Cable Rated 5,000V through 46,000V and Cable Joints for Use with Laminated Dielectric Cable Rated 2,500V through 500,000V.

6. National Electrical Contractors Association, Inc. (NECA): 5055, Standard of Installation.

7. 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, Crosslinked-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.

8. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC).

9. 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. 910, Standard for Safety Test Method for Fire and Smoke Characteristics of Electrical and Optical-Fiber Cables Used in Air Handling Spaces.

   i. 1072, Standard for Safety Medium-Voltage Power Cables.

   j. 1277, Standard for Safety Electrical Power and Control Tray Cables with Optional Optical-Fiber Members.

   k. 1581, Standard for Safety Reference Standard for Electrical Wires, Cables, and Flexible Cords.

1.02 SUBMITTALS

A. Shop Drawings:

1. Wire and cable descriptive product information.

2. Wire and cable accessories descriptive product information.

1.03 UL COMPLIANCE

A. Materials manufactured within scope of Underwriters Laboratories shall conform to UL Standards and have an applied UL listing mark.

PART 2 - PRODUCTS

2.01 CONDUCTORS 600 VOLTS AND BELOW

A. Conform to applicable requirements of NEMA WC 3, WC 5, and WC 7.

B. Conductor Type: All circuits stranded copper.

C. Insulation: Type THHN/THWN, except for sizes No. 6 and larger, with XHHW insulation.

D. Flexible Cords and Cables:

1. Type SOW-A/50 with ethylene propylene rubber insulation in accordance with UL 62, 600-volt rating.

2. Conform to physical and minimum thickness requirements of NEMA WC 8.

2.02 600 VOLT RATED CABLE

A. General:

1. Type: TC, meeting requirements of UL 1277, including Vertical Tray Flame Test at 20,000 Btu/hr, and NFPA 70, Article 340, or UL 13 Listed Power Limited Circuit Cable meeting requirements of NFPA 70, Article 725.

2. Permanently and legibly marked with manufacturer's name, maximum working voltage for which cable was tested, type of cable, and UL listing mark.

3. Suitable for installation in open air, in cable trays, or conduit.

4. Minimum Temperature Rating: 90 degrees C dry locations, 75 degrees C wet locations.

5. Overall Outer Jacket: PVC, flame-retardant, sunlight- and oil-resistant.

B. Type 1, Multiconductor Control Cable:

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-1.

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	0.83	60
25	1.00	60
37	1.15	80

4. Manufacturers:

a. Okonite Co.

b. Rome Cable.

c. General Cable.

C. Type 3-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.

   d. Jacket: 4-mil nominal nylon.

   e. Color Code: Pair conductors black and red.

5. Manufacturers:

   a. Okonite Co.

   b. Alpha Wire Corp.

D. Type 4-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. Individual Pair 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:

   a. Okonite Co.

   b. Alpha Wire Corp.

2.03 GROUNDING CONDUCTORS

A. Equipment: Stranded copper with green, Type USE/RHH/RHW-XLPE or THHN/THWN, insulation, 19 strand MTW.

B. Direct Buried: Bare stranded copper.

2.04 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.

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 1.

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. Uninsulated Crimp Connectors and Terminators:

a. Manufacturers and Products:
1) Square D; Versitide.
2) Thomas & Betts; Color-Keyed.
3) ILSCO.

5. Uninsulated, Bolted, Two-Way Connectors and Terminators:

a. Manufacturers and Products:
1) Thomas & Betts; Locktite.
2) Brundy; 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, crosslinked polyofin.

1. Manufacturer and Product: Thomas & Betts; SHRINK-KON.

2.05 PULLING COMPOUND

A. Nontoxic, noncorrosive, 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.

2.06 SOURCE QUALITY CONTROL

A. Conductors 600 Volts and Below: Test in accordance with UL 44 and 854 Standards.

PART 3 - EXECUTION

3.01 GENERAL

A. Conductor installation to be in accordance with NECA 5055.

B. Conductor and cable sizing shown is based on copper conductors.

C. Do not exceed cable manufacturer's recommendations for maximum pulling tensions and minimum bending radii.

D. Tighten screws and terminal bolts in accordance with UL 486A for copper conductors.

E. Cable Lugs: Provide with correct number of holes, bolt size, and center-to-center spacing as required by equipment terminals. Only one wire per lug.

F. Bundling: Where single conductors and cables in manholes, handholes, vaults, cable trays, 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 18 inches on center.

G. Ream, remove burrs, and clear interior of installed conduit before pulling wires or cables.

3.02 POWER CONDUCTOR COLOR CODING

A. Conductors 600 Volts and Below:

1. No. 6 AWG and Larger: Apply general purpose, flame retardant tape at each end, and at accessible locations wrapped at least six full overlapping turns, covering an area 1-1/2 to 2 inches wide.

2. No. 8 AWG and Smaller: Provide colored conductors.

3. Colors:

System	Conductor	Color
All Systems	Equipment Grounding	Green
240/120 Volts Single-Phase, Three-Wire	Grounded Neutral One Hot Leg Other Hot Leg	White Black Red
208Y/120 Volts Three-Phase, Four-Wire	Grounded Neutral Phase A Phase B Phase C	White Black Red Blue

System	Conductor	Color
240/120 Volts Three-Phase, Four-Wire Delta, Center Tap Ground on Single-Phase	Grounded Neutral Phase A High (wild) Leg Phase C	White Black Orange Blue
480Y/277 Volts Three-Phase, Four-Wire	Grounded Neutral Phase A Phase B Phase C	White Brown Purple Yellow
NOTE: Phase A, B, C implies direction of positive phase rotation.		

4. Tracer: Outer covering of white with an identifiable colored strip other than green in accordance with NFPA 70.

3.03 CIRCUIT IDENTIFICATION

A. All Circuits:

1. Assign circuit name based on device or equipment at load end of circuit.
2. Where this would result in same name being assigned to more than one circuit, add number or letter to each otherwise identical circuit name to make it unique.
3. All conductors shall be numbered and color coded at each terminal.

B. Method:

1. Conductors No. 3 AWG and Smaller: Identify with sleeves.
2. Cables and Conductors No. 2 AWG and Larger:
   a. Identify with marker plates.
   b. Attach marker plates with nylon tie cord.
3. Taped-on markers or tags relying on adhesives not permitted.

3.04 CONDUCTORS 600 VOLTS AND BELOW

A. Install 10 AWG or 12 AWG conductors for branch circuit power wiring in lighting and receptacle circuits.

B. Do not splice incoming service conductors and branch power distribution conductors No. 6 AWG and larger unless specifically indicated or approved by OWNER.

C. Connections and Terminations:

1. Install wire nuts only on solid conductors.

2. Install nylon self-insulated crimp connectors and terminators for instrumentation, control, and power circuit conductors No. 6 AWG and smaller.

3. Install uninsulated crimp connectors and terminators for instrumentation, control, and power circuit conductors No. 4 AWG through No. 2/0 AWG.

4. Install uninsulated, bolted, two-way connectors and terminators for power circuit conductors No. 4/0 AWG and larger.

5. Install uninsulated bolted, two-way connectors for motor circuit conductors No. 12 and larger.

6. Tape insulate all uninsulated connections.

7. Place no more than one conductor in any single-barrel pressure connection.

8. Install crimp connectors with tools approved by connector manufacturer.

9. Install terminals and connectors acceptable for type of material used.

10. Compression Lugs:

    a. Attach with a tool specifically designed for purpose.

    b. Tool shall provide complete, controlled crimp and shall not release until crimp is complete.

    c. Do not use plier type crimpers.

11. All conductors and terminals to permanently identify at each terminal point.

D. Do not use soldered mechanical joints.

E. Splices and Terminations:

1. Indoors: Use general purpose, flame retardant tape.

2. Outdoors: Use flame retardant, cold- and weather-resistant tape.

F. Cap spare conductors and conductors with UL listed end caps. Identify spare conductors as spares.

G. Cabinets, Panels, and Motor Control Centers:

1. Remove surplus wire, bridle and secure.

2. Where conductors pass through openings or over edges in sheet metal, remove burrs, chamfer edges, and install bushings and protective strips of insulating material to protect the conductors.

H. Control and Instrumentation Wiring:

1. Where terminals provided will accept such lugs, terminate control and instrumentation wiring, except solid thermocouple leads, with insulated, locking-fork compression lugs.

2. Terminate with methods consistent with terminals provided, and in accordance with terminal manufacturer's instructions.

3. Locate splices in readily accessible cabinets or junction boxes using terminal strips.

4. Cable Protection:

a. Under Infinite Access Floors: May be installed without bundling.

b. All Other Areas: Install individual wires, pairs, or triads in flex conduit under the floor or grouped into bundles at least 1/2 inch in diameter.

c. Maintain integrity of shielding of instrumentation cables.

d. Ensure grounds do not occur because of damage to jacket over the shield.

I. Extra Conductor Length: Install minimum 6 feet of extra conductor in freestanding panels and minimum 2 feet in other assemblies.

3.05 LOW VOLTAGE CABLES, 600 VOLTS MAXIMUM

A. Visual and Mechanical Inspection:

1. Inspect Each Individual Exposed Power Cable No. 6 and Larger for:

a. Physical damage.

b. Proper connections in accordance with single-line diagram.

c. Cable bends not in conformance with manufacturer's minimum allowable bending radius where applicable.

d. Color coding conformance with specifications.

e. Proper circuit identification.

2. Mechanical Connections for:

a. Proper lug type for conductor material.

b. Proper lug installation.

c. Bolt torque level in accordance with NETA ATS, Table 10.1, unless otherwise specified by manufacturer.

3. Shielded Instrumentation Cables for:

a. Proper shield grounding.

b. Proper terminations.

c. Proper circuit identification.

4. Control Cables for:

a. Proper termination.

b. Proper circuit identification.

5. Cables Terminated Through Window Type CTs: Verify that neutrals and grounds are terminated for correct operation of protective devices.

B. Electrical Tests for Conductors No. 6 and Larger:

1. Insulation Resistance Tests:

a. Utilize 1,000-volt dc megohmmeter for 600-volt insulated conductors.

b. Test each conductor with respect to ground and to adjacent conductors per IEEE 118 procedures for 1 minute.

c. Evaluate ohmic values by comparison with conductors of same length and type.

d. Investigate values less than 50 megohms.

2. Continuity test by ohmmeter method to ensure proper cable connections.

END OF SECTION

SECTION 16450
GROUNDING

PART 1 - GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this Section:

1. American National Standards Institute (ANSI): C2, National Electrical Safety Code (NESC).

2. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC).

1.02 SUBMITTALS

A. Shop Drawings:

1. Product Data:

a. Exothermic weld connectors.

b. Mechanical connectors.

c. Compression connectors.

d. Ground Rods.

1.03 UL COMPLIANCE

A. Materials manufactured within scope of Underwriters Laboratories shall conform to UL Standards and have an applied UL listing mark.

PART 2 - PRODUCTS

2.01 GROUND ROD

A. Material: Copper-clad.

B. Diameter: Minimum 5/8 inch.

C. Length: Minimum 10 feet.

2.02 GROUND CONDUCTORS

A. As specified in Section 16120, CONDUCTORS.

2.03 CONNECTORS

A. Exothermic Weld Type:

1. Outdoor Weld: Suitable for exposure to elements or direct burial.

2. Indoor Weld: Utilize low-smoke, low-emission process.

3. Manufacturers:

a. Erico Products, Inc.; Cadweld and Cadweld Exolon.

b. Thermoweld.

B. Mechanical Type: Split-bolt, saddle, or cone screw type; copper alloy material.

1. Manufacturers:

a. Burndy Corp.

b. Thomas and Betts Co.

2.04 GROUNDING WELLS

A. Ground rod box complete with cast iron riser ring and traffic cover marked GROUND ROD.

B. Manufacturers:

1. Christy Co.

2. Lightning and Grounding Systems, Inc.

PART 3 - EXECUTION

3.01 GENERAL

A. Grounding shall be in compliance with NFPA 70 and ANSI C2.

B. Ground electrical service neutral at service entrance equipment to supplementary grounding electrodes.

C. Ground each separately derived system neutral to nearest effectively grounded building structural steel member or separate grounding electrode.

D. Bond together system neutrals, service equipment enclosures, exposed noncurrent-carrying metal parts of electrical equipment, metal raceways, ground conductor in raceways and cables, receptacle ground connections, and metal piping systems.

E. Shielded Power Cables: Ground shields at each splice or termination in accordance with recommendations of splice or termination manufacturer.

F. Shielded Control Cables:

1. Ground shield to ground bus at power supply for analog signal.

2. Expose shield minimum 1 inch at termination to field instrument and apply heat shrink tube.

3. Do not ground control cable shield at more than one point.

G. The ground plane shall consist of copper ground rods spaced at a minimum of 20' apart as shown on the drawings. Rods and system ground shall be connected to the service entrance ground as required by the drawings. The ground resistance shall be tested and additional rods or plates added to achieve a dry season resistance not exceeding 5 ohms. The Contractor shall test the ground resistance of the system by 3 point method fall of potential.

3.02 WIRE CONNECTIONS

A. Ground Conductors: Install in conduit containing power conductors and control circuits above 50 volts.

B. Nonmetallic Raceways and Flexible Tubing: Install an equipment grounding conductor connected at both ends to noncurrent-carrying grounding bus.

C. Connect ground conductors to raceway grounding bushings.

D. Extend and connect ground conductors to ground bus in all equipment containing a ground bus.

E. Connect enclosure of equipment containing ground bus to that bus.

F. Bolt connections to equipment ground bus.

G. Bond grounding conductors to metallic enclosures at each end, and to intermediate metallic enclosures.

H. Junction Boxes: Furnish materials and connect to equipment grounding system with grounding clips mounted directly on box, or with 3/8-inch machine screws.

3.03 GROUND RODS

A. Install full length with conductor connection at upper end.

B. Install with connection point below finished grade, unless otherwise shown.

3.04 GROUNDING WELLS

A. Install riser ring and cover flush with surface.

B. Place 6 inches crushed rock in bottom of each well.

3.05 CONNECTIONS

A. General:

1. Abovegrade Connections: Use mechanical.
2. Belowgrade Connections: Install exothermic weld connectors.
3. Remove paint, dirt, or other surface coverings at connection points to allow good metal-to-metal contact.
4. Notify OWNER prior to backfilling ground connections.

B. Exothermic Weld Type:

1. Wire brush or file contact point to bare metal surface.
2. Use welding cartridges and molds in accordance with manufacturer's recommendations.
3. Avoid using badly worn molds.
4. Mold to be completely filled with metal when making welds.
5. After completed welds have cooled, brush slag from weld area and thoroughly clean joint.

C. Mechanical Type:

1. Apply homogeneous blend of colloidal copper and rust and corrosion inhibitor before making connection.
2. Install in accordance with connector manufacturer's recommendations.
3. Do not conceal mechanical connections.

3.06 METAL STRUCTURE GROUNDING

A. Provide electrical contact between metal frames and railings supporting pushbutton stations, receptacles, and instrument cabinets, and raceways carrying circuits to these devices.

3.07 SURGE PROTECTION EQUIPMENT GROUNDING

A. Connect surge arrestor ground terminals to equipment ground bus.

3.08 FIELD QUALITY CONTROL

A. Visual and Mechanical Inspection:

1. Equipment and circuit grounds for proper connection and tightness.

2. Ground bus connections assemblies for proper termination and tightness.

3. Effective transformer core and equipment grounding.

4. Accessible connections to grounding electrodes for proper fit and tightness.

5. Accessible exothermic-weld grounding connections to verify that molds were fully filled and proper bonding was obtained.

B. Electrical Tests:

1. Fall-Of-Potential Test:

a. In accordance with IEEE 81, Section 8.2.1.5 for measurement of main ground system's resistance.

b. Main ground electrode system resistance to ground to be no greater than 5 ohms.

2. Two-Point Direct Method Test:

a. In accordance with IEEE 81, Section 8.2.1.1 for measurement of ground resistance between main ground system, equipment frames, and system neutral and derived neutral points.

b. Equipment ground resistance shall not exceed main ground system resistance by 0.50 ohm.

END OF SECTION

APPENDIX A
PBCHD PWS PERMIT

ELECTRONIC CORRESPONDENCE

PERMITTEE:
Julia Parham, P.E
Water Utilities Engineer
City of Lake Worth
301 College Street
Lake Worth, FL 33460
jparham@lakeworth.org

PWS ID NUMBER: 4500773
PERMIT NUMBER: 138272-213-WC
DATE OF ISSUE: 09/02/2016
EXPIRATION DATE: 09/01/2016
COUNTY: Palm Beach
PROJECT: Water Treatment Plant Lime System Upgrades and Improvements

This permit is issued under the provisions of Chapter(s) 403, Florida Statutes, and Florida Administrative Code Rule(s) 62-550, 62-555 & 62-560. The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawing(s), plans and other documents attached hereto or on file with the department and made a part hereof and specifically described as follows:

Construct:

- Replacement for the existing wet type lime bin dust collector with a dry bag shaker type unit, Uni-filter Dust Collection System, FLSmidth
  - Nominal rating of 1,200 CFM at 7.5" W.G.
  - Sixteen (16) H-8 multibags totaling 400 square feet of filter area
  - One (1) Fan 5 HP and shaker 1/3 HP
  - One (1) Hopper, support legs and Magnehelic gage
  - Associated piping and electrical
- Replacement of the existing gravity type coagulant feed system with a duplex metering pump skid, ProMinent SS2
  - Two (2) Pumps, Gamma L GALA0420, 4.5 GPH at 58 PSI
  - One (1) 500 ml PVC calibration column
  - Two (2) 164 ml pulsation dampeners
  - One (1) pressure gauge
  - One (1) back pressure valve
  - Microprocessor and associated piping and electrical
- Modification of the existing lime volumetric feeders to improve feed rate control by replacing the existing DC motors with pulse wide modulated (PWM) motors and DC variable speed drives.
  - One (1) Merrick Xtra Drive DC Motor Controller
  - One (1) PWM Rated Motor, 0.75 HP, SCR 1.25 HP DC Motor

These modifications will not change the current rated capacity of 17.4 MGD

In Accordance With: Application Form DEP 62-555.900(1), engineering drawing sheets G-1 through G-3, M-1 through M-8, S-1 through S-11and E-1 through E8 received August 11, 2016 and equipment specifications received August 30, 2016.

Located: At the existing Lake Worth Water Treatment Plant on College Street, in the City of Lake Worth, Florida.

To Serve: Existing and future connections.

Subject To: General Conditions 1 – 15, Regulatory Conditions 1- 9, Construction Standards 1-7 and Specific Conditions 1 – 11.

A. General Conditions

The permittee shall be aware of and operate under the Permit Conditions below. These applicable conditions are binding upon the permittee and enforceable pursuant to Chapter 403, Florida Statutes. [F.A.C. Rule 62-555.533(1)]

1. The terms, conditions, requirements, limitations and restrictions set forth in this permit, are "permit conditions" and are binding and enforceable pursuant to Sections 403.141, 403.727, or 403.859 through 403.861, F.S. The permittee is placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of these conditions.

2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the Department.

3. As provided in Subsections 403.087(6) and 403.722(5), F.S., the issuance of this permit does not convey any vested rights or any exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, state, or local laws or regulations. This permit is not a waiver of or approval of any other department permit that may be required for other aspects of the total project which are not addressed in this permit.

4. This permit conveys no title to land or water, does not constitute State recognition or acknowledgment of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title.

5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, or plant life, or property caused by the construction or operation of this permitted source, or from penalties therefore; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department.

6. The permittee shall properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed and used by the permittee to achieve compliance with the conditions of this permit, as required by Department rules. This provision

includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.

7. The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at reasonable times (reasonable time may depend on the nature of the concern being investigated), access to the premises where the permitted activity is located or conducted to:

    a. Have access to and copy any records that must be kept under conditions of the permit;
    b. Inspect the facility, equipment, practices, or operations regulated or required under this permit; and

    c. Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.

8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately provide the Department with the following information:

    a. A description of and cause of noncompliance; and
    b. The period of noncompliance, including dates and times; or, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the noncompliance. The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the Department for penalties or for revocation of this permit.

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the Florida Statutes or Department rules, except where such use is prescribed by Sections 403.111 and 403.73, F.S. Such evidence shall only be used to the extent it is consistent with the Florida Rules of Civil Procedure and appropriate evidentiary rules.

10. The permittee agrees to comply with changes in Department rules and Florida Statutes after a reasonable time for compliance; provided, however, the permittee does not waive any other rights granted by Florida Statutes or Department rules. A reasonable time for compliance with a new or amended surface water quality standard, other than those standards addressed in Rule 62-302.500, shall include a reasonable time to obtain or be denied a mixing zone for the new or amended standard.

11. This permit is transferable only upon Department approval in accordance with Rule 62- 4.120 and 62-730.300, F.A.C., as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department.

12. This permit or a copy thereof shall be kept at the work site of the permitted activity.

13. This permit also constitutes:

    a. Determination of Best Available Control Technology (BACT)
    b. Determination of Prevention of Significant Deterioration (PSD)

c. Certification of compliance with State Water Quality Standards (Section 401, PL 92-500)
d. Compliance with New Source Performance Standards

14. The permittee shall comply with the following:

a. Upon request, the permittee shall furnish all records and plans required under Department rules. During enforcement actions, the retention period for all records will be extended automatically unless otherwise stipulated by the Department.

b. The permittee shall hold at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation) required by the permit, copies of all reports required by this permit, and records of all data used to complete the application for this permit. These materials shall be retained at least three years from the date of the sample, measurement, report, or application unless otherwise specified by Department rule.

c. Records of monitoring information shall include:
   i. the date, exact place, and time of sampling or measurements;
   ii. the person responsible for performing the sampling or measurements;
   iii. the dates analyses were performed;
   iv. the person responsible for performing the analyses;
   v. the analytical techniques or methods used;
   vi. the results of such analyses.

15. When requested by the Department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware the relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be corrected promptly.

B. Regulatory Section

1. All construction must be in accordance with this permit. Before commencing work on project changes for which a construction permit modification is required per 62-555.536(1), the permittee shall submit to the Department a written request for a permit modification. Each such request shall be accompanied by one copy of a revised construction permit application, the proper processing fee and one copy of either a revised preliminary design report or revised drawings, specifications and design data. [F.A.C. Rule 62-555.536].

2. Permitted construction or alteration of public water supply systems must be supervised during construction by a professional engineer registered in the State of Florida if the project was designed under the responsible charge of a professional engineer licensed in the State of Florida. The permittee must retain the service of a professional engineer registered in the State of Florida to observe that construction of the project is in accordance with the engineering plans and specifications as submitted in support of the application for this permit. [F.A.C. Rule 62-555.520(3)].

3. If prehistoric or historic artifacts, such as pottery or ceramics, stone tools or metal implements, dugout canoe remains, or any other physical remains that could be associated with Native American cultures, or early colonial or American settlement are encountered at any time within the project site area, the permitted project should cease all activities involving

subsurface disturbance in the immediate vicinity of such discoveries. The permittee, or other designee, should contact the Florida Department of State, Division of Historical Resources, Compliance and Review Section at 850.245.6333 or 800.847.7278, as well as the appropriate permitting agency office. Project activities should not resume without verbal and/or written authorization from the Division of Historical Resources and the permitting agency. In the event that unmarked human remains are encountered during permitted activities, all work shall stop immediately and the proper authorities notified in accordance with Section 872.05, *Florida Statutes*.

4. If delays will cause project completion to extend beyond the expiration date of this permit, the permittee shall submit to the Department a request to extend the expiration date of this permit including the appropriate processing fee. This request shall specify the reasons for the delay and shall be submitted to the Department for approval prior to the expiration date of this permit. Note that no specific construction permit shall be extended so as to remain in effect longer than five years. [F.A.C. Rule 62-555.536(4)].

5. In accordance with General Condition #11 of this permit, this permit is transferable only upon Department approval. Persons proposing to transfer this permit must apply jointly for a transfer of the permit within 30 days after the sale or legal transfer of ownership of the permitted project that has not been cleared for service by the Department using form, 62-555.900(8), Application for Transfer of a PWS Construction Permit along with the appropriate fee. [F.A.C. Rule 62-555.536(5)]

6. This permit satisfies Drinking Water permitting requirements only and does not authorize construction or operation of this facility prior to obtaining all other necessary permits from other program areas within the Department, or required permits from other state, federal, or local agencies.

7. This permit is for CONSTRUCTION ONLY of the distribution system project. This permit shall not infer that the clearance necessary for connection will be granted. Any such clearance shall be granted only when the connection point has been permitted and cleared for use by the Department and the public water system to which the water main extension will be connected, has the capacity necessary to meet the design water demands of all customers to be served by the water main extension. Partial clearance may be granted, if required.

8. If gasoline contamination is found at the construction site, work shall be stopped and the proper authorities notified. With the approval of the Department, ductile iron pipe and fittings, and solvent resistant gaskets materials shall be used in the contaminated area. The ductile pipe shall be used in the contaminated area. The ductile iron pipe shall extend 100 feet beyond any solvent noted. Any contaminated soil that is excavated shall be placed on an impermeable mat, covered with waterproof covering, and held for disposal. <u>If the site cannot be properly cleaned, then consultation with the Department is necessary prior to continuing with the project construction.</u>

9. This permit does not constitute approval of construction on jurisdictional wetland areas; therefore such approval must be obtained separately from the Water Management District or from DEP ERP Section, as applicable, Permittee shall provide a copy of the permit approval to the Department if water main installation involves activities on wetlands.

C. Construction Standards

1. All products, including paints, which shall come into contact with potable water, either directly or indirectly, shall conform with National Sanitation Foundation (NSF) International, Water

Chemicals Codex, Food Chemicals Codex, American Water Works Association (AWWA) Standards and the Food and Drug Administration, as provided in Rule 62-555.320(3), F.A.C.

2. Water supply facilities, including mains, pipe, fittings, valves, fire hydrants and other materials shall be installed in accordance with the latest applicable AWWA Standards and Department rules and regulations.

3. The installation or repairs of any public water system, or any plumbing in residential or nonresidential facilities providing water for human consumption, which is connected to a public water system shall be lead free in accordance with Rule 62-555.322, F.A.C.

4. When any existing asbestos cement (AC) pipes are replaced under this permit, the permittee shall do so in accordance with the applicable rules of Federal Asbestos Regulation and Florida DEP requirements. **For specific requirements applicable to AC pipes, the permittee should contact the Air and Waste Management section at DOH Palm Beach County prior to commencing any such activities at (561) 837-5900 #3. Please be aware that a notification is required to be submitted to the Department for a regulated project**

5. Permittee shall maintain vertical clearance and horizontal separation between water mains and sanitary sewers, storm sewers, etc. unless approved otherwise by the Department, as provided in Rule 62-555.314, F.A.C., and Section 8.6 of *Recommended Standards for Water Works*, a manual adopted by reference in Rule 62-555.330(3), F.A.C.

6. The new or altered aboveground piping at the drinking water treatment plant shall be color coded and labeled as recommended in Section 2.14 of "Recommended Standards for Water Works, 1997 Edition". [F.A.C. Rule 62-555.320(10)]

7. Permittee shall ensure that there shall be no cross-connection with any non-potable water source in accordance with Rule 62-555.360, F.A.C.

D. Clearance Requirements

1. The permittee must instruct the engineer of record to request system clearance from the Department within sixty (60) days of completion of construction, testing and disinfecting the system. Bacteriological test results shall be considered unacceptable if the test were completed more than 60 days before the Department received the results. [F.A.C. Rule 62-555.340(2)(c)] Permitted construction or alteration of a public water system may not be placed into service until a letter of clearance has been issued by this Department. [F.A.C. Rule 62-555.345]

2. Prior to placing this project into service, Permittee shall submit, at a minimum, all of the following to the Department for evaluation and approval for operation, as provided in Rules 62-555.340 and 62-555.345, F.A.C.:

   a. the engineer's *Certification of Construction Completion and Request for Clearance to Place Permitted PWS Components Into Operation* {DEP Form 62-555.900(9)};

   b. certified record drawings, if there are any changes noted for the permitted project.

In order to facilitate the issuance of a letter of clearance, the Department requests that all of the above information be submitted as one package.

Issued This 2ND Day of September, 2016.

STATE OF FLORIDA DEPARTMENT OF HEALTH
PALM BEACH COUNTY

Alina M. Alonso, MD, Director

c: Engineer-of-Record: Jason A. Pugsley, P.E.
Florida DEP: Diane Pupa

CITY OF LAKE WORTH

FLORIDA

MATHEWS CONSULTING

a BAXTER & WOODMAN company